

Федеральное государственное бюджетное образовательное учреждение высшего образования «Северо-Осетинская государственная медицинская академия»
Министерства здравоохранения Российской Федерации

Кафедра микробиологии

УТВЕРЖДЕНО

протоколом заседания Центрального
координационного учебно-методического
совета от «05» февраля 2021 г. № 3.

ФОНД ОЦЕНОЧНЫХ СРЕДСТВ

по дисциплине- микробиология, вирусология, иммунология

основной профессиональной образовательной программы высшего образования –
программы специалитета по специальности 31.05.01 Лечебное дело(частично
реализуемая на английском языке) утвержденной 26.02.2021 г.

для студентов 2-3 курсов

по специальности 31.05.01 Лечебное дело (частично реализуемая на английском языке)

Рассмотрено и одобрено на заседании кафедры
от «03» февраля 2021 г. (протокол № 7)

Заведующая кафедрой микробиологии

д.м.н.  Третьякова И.Е.

г. Владикавказ, 2021 г.

СТРУКТУРА ФОС

1. Титульный лист
2. Структура ФОС
3. Рецензия на ФОС
4. Паспорт оценочных средств
5. Комплект оценочных средств:
 - эталоны тестовых заданий (с титульным листом и оглавлением),
 - экзаменационные вопросы

Паспорт фонда оценочных средств по дисциплине

«Микробиология, вирусология, иммунология»

№п/п	Наименование контролируемого раздела дисциплины	Код формируемой компетенции	Наименование оценочного средства
1	2	3	4
Вид контроля	Промежуточный		
1.	Раздел 1. Общая микробиология. Морфология и физиология микробов.	ОПК-7	тестовые задания; экзаменационные билеты
2.	Раздел 2. Экология микробов. Нормальная микрофлора организма человека.	ОПК-7	тестовые задания; экзаменационные билеты
3.	Раздел 3. Основы генетики микробов. Основы генетической инженерии и медицинской биотехнологии.	ОПК-7	тестовые задания; экзаменационные билеты
4.	Раздел 4. Общая вирусология.	ОПК-7	тестовые задания; экзаменационные билеты
5.	Раздел 5. Симбиоз человека с микробами. Учение об инфекции.	ОПК-7	тестовые задания; экзаменационные билеты
6.	Раздел 6. Медицинская иммунология. Медицинские иммунобиологические препараты.	ОПК-7	тестовые задания; экзаменационные билеты

			билеты
7.	Раздел 7. Бактерии-возбудители инфекционных заболеваний человека.	ОПК-7	тестовые задания; экзаменационные билеты
8.	Раздел 8. Вирусы-возбудители инфекционных заболеваний человека.	ОПК-7	тестовые задания; экзаменационные билеты
9.	Раздел 9. Клиническая микробиология.	ОПК-7	тестовые задания; экзаменационные билеты

**Федеральное государственного бюджетного образовательного учреждение высшего образования «Северо-Осетинская государственная медицинская академия»
Министерства здравоохранения Российской Федерации**

Кафедра микробиологии

Тестовые задания

по дисциплине- «Микробиология, вирусология, иммунология»

для студентов 2-3 курсов

' по специальности - 31.05.01 «Лечебное Дело» (частично реализуемая на английском языке)

**Рассмотрено и одобрено на заседании
кафедры**

от «03» февраля 2021 г. (протокол № 7)

Зав. кафедрой микробиологии,

д.м.н. И.Е. Третьякова

г. Владикавказ, 2021 г.

Оглавление

№	Наименование контролируемого раздела дисциплины	Количество тестов (всего)	Код формируемых компетенций
1	2	3	4
Вид контроля			
1.	Раздел 1. Общая микробиология. Морфология и физиология микробов.	84	ОПК-7
2.	Раздел 2. Экология микробов. Нормальная микрофлора организма человека.	84	ОПК-7
3.	Раздел 3. Основы генетики микробов. Основы генетической инженерии и медицинской биотехнологии.	42	ОПК-7
4.	Раздел 4. Общая вирусология.	42	ОПК-7
5.	Раздел 5. Симбиоз человека с микробами. Учение об инфекции.	84	ОПК-7
6.	Раздел 6. Медицинская иммунология. Медицинские иммунобиологические препараты.	42	ОПК-7
7.	Раздел 7. Бактерии-возбудители инфекционных заболеваний человека.	252	ОПК-7
8.	Раздел 8. Вирусы-возбудители инфекционных заболеваний человека.	21	ОПК-7
9.	Раздел 9. Клиническая микробиология.	21	ОПК-1

**Тестовые задания по микробиологии, вирусологии, иммунологии для
студентов лечебного факультета (2-3 курсы)**

2-3 КУРСЫ, 4,5 СЕМЕСТРЫ

**Федеральное государственное бюджетное образовательное учреждение высшего
образования «Северо-Осетинская государственная медицинская академия»
Министерства здравоохранения Российской Федерации**

Кафедра микробиологии

Факультет лечебный

Курсы 2-3 Семестры 4,5

**Дисциплина «Микробиология, вирусология, иммунология» (частично реализуемая на
английском языке)**

**Федеральное государственное бюджетное образовательное учреждение высшего образования «Северо-Осетинская государственная медицинская академия»
Министерства здравоохранения Российской Федерации**

РЕЦЕНЗИЯ

на фонд оценочных средств

по микробиологии, вирусологии, иммунологии

для студентов лечебного факультета

2-3 курсов

по специальности 31.05.01 «Лечебное Дело» (частично реализуемая на английском языке)

Фонд оценочных средств составлен на кафедре микробиологии на основании рабочей и типовой программ учебной дисциплины и соответствуют требованиям ФГОС.

Фонд оценочных средств включает в себя банк тестовых заданий, экзаменационные билеты.

Банк тестовых заданий включает в себя следующие элементы: тестовые задания, варианты тестовых заданий, шаблоны ответов. Все задания соответствуют рабочей программе по микробиологии, вирусологии и охватывают все её разделы. Количество тестовых заданий составляет 672. Сложность заданий варьируется. Количество заданий по каждому разделу дисциплины достаточно для проведения контроля знаний и исключает многократное повторение одного и того же вопроса в различных вариантах. Банк содержит ответы ко всем тестовым заданиям и задачам.

Количество экзаменационных билетов составляет 40, что достаточно для проведения экзамена и исключает неоднократное использование одного и того же билета во время экзамена в одной академической группе в один день. Экзаменационные билеты выполнены на бланках единого образца по стандартной форме, на бумаге одного цвета и качества. Экзаменационный билет включает в себя 3 вопроса. Формулировки вопросов совпадают с формулировками перечня вопросов, выносимых на экзамен. Содержание вопросов одного билета относится к различным разделам программы, позволяющее более полно охватить материал учебной дисциплины. Сложность вопросов в экзаменационных билетах распределена равномерно. Замечаний к рецензируемому фонду оценочных средств нет. В целом, фонд оценочных средств по микробиологии, вирусологии, иммунологии способствует качественной оценке уровня владения обучающимися общекультурными и профессиональными компетенциями.

Рецензируемый фонд оценочных средств по микробиологии, вирусологии, иммунологии может быть рекомендован к использованию для промежуточной аттестации на лечебном факультете у студентов 2-3 курсов.

Рецензент:

Зав. кафедрой биологии и гистологии
ФГБОУ ВО СОГМА Минздрава РФ,
профессор, д.м.н.

/Л.В. Бибаева/

**Федеральное государственное бюджетное образовательное учреждение высшего образования «Северо-Осетинская государственная медицинская академия»
Министерства здравоохранения Российской Федерации**

РЕЦЕНЗИЯ

на фонд оценочных средств

по микробиологии, вирусологии, иммунологии

для студентов лечебного факультета

2-3 курсов

по специальности 31.05.01 «Лечебное Дело» (частично реализуемая на английском языке)

Фонд оценочных средств составлен на кафедре микробиологии на основании рабочей и типовой программ учебной дисциплины и соответствуют требованиям ФГОС.

Фонд оценочных средств включает в себя банк тестовых заданий, экзаменационные билеты.

Банк тестовых заданий включает в себя следующие элементы: тестовые задания, варианты тестовых заданий, шаблоны ответов. Все задания соответствуют рабочей программе по микробиологии, вирусологии и охватывают все её разделы. Количество тестовых заданий составляет 672. Сложность заданий варьируется. Количество заданий по каждому разделу дисциплины достаточно для проведения контроля знаний и исключает многократное повторение одного и того же вопроса в различных вариантах. Банк содержит ответы ко всем тестовым заданиям и задачам.

Количество экзаменационных билетов составляет 40, что достаточно для проведения экзамена и исключает неоднократное использование одного и того же билета во время экзамена в одной академической группе в один день. Экзаменационные билеты выполнены на бланках единого образца по стандартной форме, на бумаге одного цвета и качества. Экзаменационный билет включает в себя 3 вопроса. Формулировки вопросов совпадают с формулировками перечня вопросов, выносимых на экзамен. Содержание вопросов одного билета относится к различным разделам программы, позволяющее более полно охватить материал учебной дисциплины. Сложность вопросов в экзаменационных билетах распределена равномерно. Замечаний к рецензируемому фонду оценочных средств нет. В целом, фонд оценочных средств по микробиологии, вирусологии, иммунологии способствует качественной оценке уровня владения обучающимися общекультурными и профессиональными компетенциями.

Рецензируемый фонд оценочных средств по микробиологии, вирусологии, иммунологии может быть рекомендован к использованию для промежуточной аттестации на лечебном факультете у студентов 2-3 курсов.

Рецензент

Председатель ЦУМК
естественнонаучных и математических
дисциплин с подкомиссией по экспертизе
оценочных средств, доцент

Н.И. Боциева

Delivery of the module No 1.

“General microbiology. Structure of the bacterial cell. Simple and complex methods of coloring”

A. Choose the scientist who created the first rabies vaccine:

1. Louis Pasteur
2. Robert Koch.
3. Ilya I. Mechnikov.
4. Antonie van Leeuwenhoek.

B. Choose the scientist who developed the phagocytic theory of immunity and received the Nobel Prize:

1. Louis Pasteur.
2. Robert Koch.
3. Ilya I. Mechnikov
4. Paul Ehrlich.

C. Choose the scientist who was the first to culture and describe the pathogens of tuberculosis and cholera:

1. Paul Ehrlich.
2. Ilya I. Mechnikov.
3. Louis Pasteur.
4. Robert Koch.

D. Mark the microbes that are prokaryotes:

1. Fungi.
2. Viruses.
3. Bacteria.
4. Prions.

E. Mark the distinguishing feature of the prokaryotic cell:

1. Ribosomes 70S.
2. Presence of peptidoglycan in the cell wall.
3. Presence of mitochondria.
4. Diploid set of genes.

F. Mark the components of peptidoglycan:

1. Teichoic acids.
2. N-acetylglucosamine.
3. Lipopolysaccharide.
4. Tetrapeptide.

G. Mark the structural peculiarities of the cell wall of Gram-negative bacteria:

1. Meso diammpimelic acid.
2. Teichoic acids.
3. LPS.
4. Porin protein.

H. Name the functions of bacterial spores:

1. Species preservation.
2. Heat resistance.
3. Substrate displacement.
4. Reproduction.

I. Name the obligatory intracellular parasite:

1. Rickettsiae.
2. Actinomyces.
3. Spirochetes.
4. Chlamydiae.

J. Name the peculiarities of actinomycetes:

1. Presence of thermolabile spores.
2. Gram-positive bacteria.
3. Absence of the cell wall.
4. Spiral shape.

K. Name the peculiarities of spirochetes:

1. Gram-negative bacteria.
2. Presence of motor fibrillar apparatus.
3. Spiral shape.
4. They are absolute parasites.

L. Name the protozoans with the apical complex possessing the possibility to penetrate the cell:

1. Malaria plasmodium.
2. Amoebas.
3. Toxoplasma.
4. Cryptosporidia.

M. Mark the specific feature of complex viruses:

1. Two types of nucleic acids.
2. Presence of the lipid envelope.
3. Double capsid.
4. Presence of nonstructural proteins.

N. Mark higher fungi:

1. Mucor.
2. Candida.
3. Penicillium.
4. Aspergillus.

O. Mark the representatives of the human skin flora:

1. Coryneform bacteria.
2. Staphylococcus epidermidis.
3. E.coli.
4. Yeast-like fungi.

P. Mark the bacteria responsible for colonization resistance of the intestine:

1. Bifidobacteria.
2. Lactobacilli.
3. Candida.
4. Enterococci.
5. E.coli.

Q. Biovestin-lacto

contains bifidogenic factors and B. bifidum and L.plantarum biomass. What group of drugs this drug belongs to?

R. Mark the processes applied for sterilization:

1. Autoclaving.
2. Pasteurization.
3. Dry heat treatment.
4. Gamma rays treatment.

S. Mark the agents used for disinfection:

1. Ethylene alcohol vapours.
2. Quaternary ammonium compounds.
3. Chlorinated lime.
4. 90-95% ethyl alcohol.

T. Sanitary indicator microorganisms of water are all except for (select the wrong species):

1. Total coliform bacteria.
2. Thermotolerant coliform bacteria.
3. Coliphages.
4. Hemolytic streptococci.

U. When assessing the quality of drinking water from centralized water supply, the following microbiological parameters must be determined:

1. Total bacterial count.
2. Total coliform bacteria.
3. Thermotolerant coliform bacteria.
4. *Vibrio cholera*.

V. The air sample inoculation was made using the Krotov apparatus. The sampling rate is 20 l/min; the operating time is 5min. 70 colonies have grown on the dish. Determine the total bacterial count of the air.

1. 700.
2. 1,400.
3. 100.

W. Total bacterial contamination of the air is the total count of mesophilic microorganisms contained in:

1. 1 m³.
2. 100 cm³.
3. 1 cm³.

X. Specify the nature of soil contamination showing the presence of a large number of enterococci and coliforms:

1. Fresh fecal contamination.
2. Old fecal contamination.
3. Organic contamination.

Y. The routine bacteriological study of external environmental objects at prevention and treatment facilities does not provide the identification of:

1. Total microbial contamination
2. *Staphylococcus aureus*.
3. *Pseudomonas aeruginosa*
4. Microorganisms of the Enterobacteriaceae family.

Z. Daily sanitary control of the public catering and trade facilities requires the wipes test for the presence of:

1. Coliform bacteria.
2. *Staphylococcus aureus*.
3. *Proteus*.
4. *Salmonella*.

Delivery of the module No 2.

“Physiology of microorganisms. Principles of cultivation and identification of microbes. Disinfectology. Antibiotics”.

A. What is the most process by which bacteria obtain energy through the glucose fermentation?

1. Rotting
2. Fermentation
3. Denitrophication
4. Anaerobic respiration

B. Most pathogenic bacteria, called mesophilic bacteria, grow at a temperature of:

1. 15-20 °C.
2. 20-30 °C.
3. 30-37 °C.
4. 50-55 °C.

C. Name the process of protein mineralization in the presence of oxygen:

1. Denitrophication.
2. Fermentation
3. Lyophilization.
4. Rotting.

D. Name the mechanism, which bacteria use to deliver the effector molecules into the cell cytosol:

1. Active transport.
2. Secretion by type III.
3. Secretion by type II.
4. Radical translocation.

E. Antibiotics can affect:

1. Bacteria.
2. Viruses.
3. Fungi.
4. Protozoa.
5. Prions.

F. Identify the main groups of antibiotics that interfere with the cell wall synthesis:

1. Tetracyclines.
2. β -Lactams.
3. Lincosamines.
4. Glycopeptides.
5. Polyenes.

G. Specify the groups of synthetic microbial drugs:

1. Polyenes.
2. Sulfanilamide.
3. Imidazoles.
4. Quinolones
5. Aminoglycosides.

H. Identify the groups of antimicrobial agents that disturb protein biosynthesis:

1. Oxazolidinones.
2. Tetracyclines.
3. Aminoglycosides.
4. Fluoroquinolones.
5. Carbapenems.

I. Complications in the macroorganism:

1. Dysbiosis.
2. Endotoxic shock.
3. Anaphylactic shock.
4. Hemorrhaging disorder.
5. Toxic effect on the auditory nerve.

J. In medical practice

is used for the treatment of the infectious processes, a combination of amoxicillin + clavulanic acid and ampicillin + sulbactam. Explain their advantage over the particular antibiotics.

Delivery of the module No 3. "Infectious. Immunology"

A. Name the form of infectious process in which the pathogen stays in the body for a long time without demonstrating any pathogenic properties or shedding into the environment:

1. Bacteria carriage.
2. Latent infection.
3. Slow infection.
4. Acute infection.

B. Name the factors facilitating the colonization of bacteria in the macroorganism:

1. Bacteriocins.
2. Adhesion.
3. Endotoxin.
4. IgA-protease.

C. Name the factors facilitating bacterial invasion:

1. Hyaluronidase.
2. Effector proteins of type III secretion system.
3. Endotoxin.
4. Pili.

D. In addition to the participation of the surface structures of the bacterial cell, protection against phagocytosis involves the substances secreted by this cell. Mark the enzymes that take part in the suppression of bacterial phagocytosis:

1. Extracellular adenylate cyclase.
2. IgA-protease.
3. Catalase.
4. Superoxide dismutase.

E. Mark the statements that are true about exotoxin:

1. Weak antigen.
2. Specificity of action.
3. Thermostable.
4. Stimulation of neutralizing antibody production in the body.

F. The patient with influenza

has pneumonia caused by *S. pneumoniae*. What form of the infectious process does this pneumonia caused by *S. pneumoniae* belong to?

G. One of the methods used in laboratory diagnosis

of infectious diseases is the blood culture method, which involves pathogen isolation from the patient's blood. Name the stages of infectious process during which the pathogen may be isolated from blood.

H. Mark humoral factors of innate immunity:

1. Complement.
2. IFN
3. IgE.
4. Lysozyme.
5. Defensins

I. Mark the complement components that are anaphylatoxins:

1. C3a.
2. C1q.
3. C5a.
4. C2.

J. Mark the cells of innate immunity:

1. Monocytes/macrophages.
2. Dendritic cells.
3. T-lymphocytes.
4. B-lymphocytes.
5. Trombocytes.

K. Mark the participants of the classical pathway of the complement vation:

1. C1.
2. C2.
3. C4.
4. Properdin.
5. IgM.
6. IgG

L. Mark the effector cells of the immune system:

1. Dendritic cells.
2. B-lymphocytes.
3. T-helpers.
4. T-killers.

M. Mark the APC:

1. Dendritic cells.
2. B-lymphocytes.
3. Macrophages.
4. T-helpers.

N. Mark the cells on which the MHC2 class receptor is expressed:

1. T-killers.
2. Dendritic cells.
3. Macrophages.

4. B-lymphocytes.

O. Mark the B-lymphocyte markers:

1. MHC 2 class.
2. CD40.
3. CD80.
4. CD28.

P. Mark the T-helper receptor molecules:

1. CD4.
2. CD3.
3. CD28.
4. CD40L

Q. Name the cells and mediators involved in the formation of T₁- helpers:

1. IL-12.
2. T-killers.
3. γ -interferon.
4. Activated macrophage.
5. Mast cell.

R. Name the cells and mediators involved in the formation of T₂-helpers:

1. Basophils.
2. T-killers.
3. Mast cell.
4. IL-4. +
5. TNF.

S. Name the receptor-ligase pair required for co-stimulation of APC T-helpers:

1. CD80/CD28.
2. MHC class 2/CD4.
3. MHC class 1/CD8.
4. MHC class 2/TCR.

T. Name the receptor-ligase pair essential for the stimulation of the T-killer (CD8):

1. MHC class 2/CD4.
2. MHC class 1/CD8.
3. CD40/CD40L.
4. CD80/CD28.

U. Some viruses and bacterial toxins have the property of superantigens, causing nonspecific activation of lymphocytes, leading to their death Explain the mechanism of their work.

V. Name the Ig class that passes through the placenta:

1. IgA
2. IgG.
3. IgM.

4. IgE.

W. Name the Ig class that serves as an indicator of acute infection:

1. IgA
2. IgG.
3. IgM.
4. IgE.

{. Name the Ig class that provides local immunity:

1. IgA.
2. IgG.
3. IgM.
4. IgE.

Y. Choose the properties that are characteristic of IgE:

1. It binds the complement.
2. It possesses cytophilicity to the mast cells and basophils.
3. It is involved in the development of Type I hypersensitivity.
4. It passes through the placenta.

Z. Name the Ig class with the highest avidity:

1. IgA.
2. IgG.
3. IgM.
4. IgE.

A1. What are the cells required for providing ADCC.

1. Blood natural killers.
2. T-killers.
3. Eosinophils.
4. Activated macrophages.

B1. Name the process responsible for protecting the body from repeated antigenic interventions:

1. Immune tolerance.
2. Immune memory.
3. Hypersensitivity.
4. Immune paralysis.

C1. A patient visited an allergologist.

48 hours after applying cosmetic cream, she developed inflammation and vesicles on the skin of her face. The patient had used this cream before. The doctor diagnosed the development of

contact hypersensitivity. Explain the mechanism of the development of contact hypersensitivity. Name its classification type.

D1. A Rh-negative mother

who had her first pregnancy with an Rh-positive fetus was administered an anti-rhesus serum immediately after giving birth. Explain why this medical manipulation was required.

E1. Immune tolerance

is manifested by the lack of a specific productive immune response to the antigen due to its inability to recognize it. Name the antigens to which the tolerance is most easily formed.

F1. Mark the forms of immunity in which the complement takes part:

1. Mucosal immunity.
2. Antitoxic.
3. Antibacterial humoral.
4. Humoral antiviral.

G1. Mark the forms of immunity in which the T-killers take part:

1. Transplantation.
2. Antitumor
3. Antiviral.
4. Antibacterial.

H1. Specify the forms of infections associated with the development of DTH

1. Helminth invasion.
2. Fungal.
3. Viral.
4. Parasitic.
5. Bacterial.

I1. Note the components of anti-helminthic immunity:

1. IgE.
2. T-killer.
3. Complement.
4. Eosinophils.

J1. The patient suffers from recurrent viral infections and mycosis

that does not respond to treatment. The doctor assumed that he had immunodeficiency. What immunity component is affected?

K1. Mark the reactions and tests that are used for the assessment of the immune status of the body:

1. Complement-fixation test.

2. Flow cytometry.
3. Coombs test.
4. Radial immunodiffusion.
5. Enzyme immunoassay.

L1. Name the reaction or test that is used to determine the presence of incomplete antibodies:

1. Ring precipitation test.
2. Coombs test.
3. Radial immunodiffusion.
4. Neutralization test.

M1. Mark the medicinal products that create active immunity in the body:

1. Probiotics.
2. Vaccines.
3. Immunomodulators.
4. Anatoxins.
5. Monoclonal antibodies.

Delivery of the module No 4. " Genetics of bacteria. Symbiosis. General virology "

A. Some viruses have RNA-dependent RNA polymerase as a part of their virions. Name the type of the nucleic acid of these viruses:

1. Circular double-stranded DNA.
2. Positive-sense single-stranded RNA.
3. Negative-sense single-stranded RNA
4. Linear-double-stranded DNA

B. What are the consequences of an integrative type of interaction between a virus and a cell?

1. Virus carrying.
2. Cell transformation.
3. Cell death.
4. Formation of a new generation of virions.

C. Name the process in which the bacteriophage is involved:

1. Conjugation.
2. Transformation.
3. Transduction.
4. Reparation.

D. Name the properties of the plasmid required for transferring the chromosome by conjugation:

1. Integrity.
2. Hypermotability.
3. Transmissibility.
4. Superspiralization.

E. Name the structures that are involved in the distribution of genes in the bacterial population:

1. Plasmids.
2. Integron.
3. Transposon.
4. Replicon.

F. Name the enzymes that are used in genetic engineering:

1. Restrictases.
2. Ligases.
3. Proteases.
4. DNA-polymerase.

I. In the course of sanitary and bacteriological control

of dairy products, the dysentery agent *Shigella flexneri* was cultured from sour cream samples. Immediately, the employees of the plant were checked for bacteria, during which the same type of agent and serovar were isolated from the employee K. Name the method that can be used for intraspecific identification of the isolated cultures that would confirm or disprove the fact that K. was the source of product contamination.

RECOMMENDED LIST OF EXAM QUESTIONS IN MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY FOR
MEDICAL STUDENTS

THE COMMON PART

I. Morphology of microorganisms

1. Basic principles of classification of microbes.
2. Morphological and tinctorial properties of bacteria. Painting methods.
3. The structure and chemical composition of bacterial cells. Features of the structure of gram-positive and gram-negative bacteria.
4. Morphology of fungi. Principles of classification.
5. The morphology of the protozoa. The principles of classification.
6. Features of virus biology.
7. Principles of classification of viruses.
8. Structure and chemical composition of viruses and bacteriophages.
9. Microscopy methods (luminescent, dark-field, phase-contrast, electronic).

II. Physiology of microorganisms

1. Growth and reproduction of bacteria, reproduction phases.
2. Methods for obtaining energy by bacteria (respiration, fermentation). Methods for the cultivation of anaerobes.
3. Types and mechanisms of bacteria nutrition.
4. Basic principles of bacterial cultivation.
5. Artificial culture media, their classification. Requirements for culture media.
6. Principles and methods of isolation of pure cultures of bacteria.
7. Enzymes of bacteria. Identification of bacteria by enzymatic activity.
8. Intraspecific identification of bacteria (epidemic marking).
9. Normal microflora of the human body and its functions. Dysbiosis Eubiotics.
10. The action of physical and chemical factors on microorganisms. The concept of sterilization, disinfection, asepsis and antiseptics.
11. Methods of sterilization, equipment.
12. The concept of chemotherapy and chemotherapy drugs. Mechanisms of action of sulfonylamides and quinolones.
13. Antibiotics: classification by source of production, method of obtaining.
14. Antibiotics: classification by chemical structure, mechanism and spectrum of action.
15. Complication of antibiotic therapy, their prevention.
16. Mechanisms of drug resistance of infectious agents. Ways to overcome drug resistance.
17. Methods for determining the sensitivity of bacteria to antibiotics.
18. Methods of virus cultivation.
19. Types of interaction of the virus with the cell. Virus reproduction phases.
20. Bacteriophages. Interaction of a phage with a bacterial cell. Moderate and virulent bacteriophages. Lysogeny.
21. Application of phages in medicine and biotechnology.

III. Genetics of bacteria

1. The structure of the genome of bacteria. The concept of genotype and phenotype. Types of variability.
2. Plasmids of bacteria, their functions and properties. The use of plasmids in genetic engineering.
3. Mechanisms of transfer of genetic material in bacteria.

IV. Infection and immunity

1. The concept of infection. Conditions for the occurrence of an infectious process.
2. Stages of development and characteristic signs of an infectious disease.
3. Pathogenicity and virulence of bacteria. Pathogenic factors.
4. Bacterial toxins, their nature, properties, production.
5. The role of I.I. Mechnikov in the formation of the doctrine of immunity. Nonspecific factors of the body's defense.
6. Complement, its structure, functions, activation pathways, role in immunity.
7. Interferons, nature. Methods for obtaining and using.
8. Species (hereditary) immunity.
9. The concept of immunity. Types of immunity.

10. Structure and function of the immune system. Cooperation of immunocompetent cells.
11. Immunocompetent cells. T and B lymphocytes, macrophages, their cooperation.
12. Immunoglobulins, structure and function.
13. Classes of immunoglobulins, their characteristics.
14. Antigens: definition, basic properties. Bacterial cell antigens
15. Antibody formation: primary and secondary response.
16. Immunological memory. Immunological tolerance.
17. Classification of hypersensitivity according to Jayle and Coombs. T-dependent hypersensitive and its clinical and diagnostic value.
18. Allergic tests, their essence, application.
19. B - dependent hypersensitivity. Mechanisms of occurrence, clinical significance.
20. Anaphylactic shock and serum sickness. Causes of occurrence. Mechanism. Their warning.
21. The concept of clinical immunology. Human immune status and factors affecting it.
22. Assessment of the immune status: basic indicators and methods of their determination
23. Primary and secondary immunodeficiencies.
24. The concept of immunomodulators. Operating principle. Application.
25. Features of antiviral immunity.
26. Diagnostic drugs, receipt, application.
27. Monoclonal antibodies.
28. Methods of preparation and use of agglutinating, adsorbed serums.
29. Reaction of agglutination. Components, mechanism, methods of setting. Application.
30. Coombs reaction. Mechanism. Components. Application.
31. Reaction of passive hemagglutination. Components. Application.
32. Reaction of precipitation. Mechanism. Components. Staging methods. Application.
33. Reaction of binding complement. Mechanism. Components. Application.
34. Reaction of neutralization of toxin with antitoxin. Mechanism. Staging methods. Application.
35. Reaction of immunofluorescence. Mechanism, components, application.
36. Immunoassay, immunoblotting, mechanism, components, application.
37. Serological tests used to diagnose viral infections.
38. Vaccines, definition, modern classification, use.
39. Live vaccines, obtaining, application. Advantages and disadvantages .
40. Killed vaccines, receipt, application.
41. Chemical vaccines. Receiving. Advantages, application.
42. Toxoid. Receiving, purification, titration, application.
43. Genetically engineered vaccines. Principles of obtaining, application.
44. Medical biotechnology, its objectives and achievements.
45. Antitoxic serum. Receiving, purification, titration, application. Complications during use and their prevention.
46. Preparations of immunoglobulins. Receiving, cleaning, indications for use.

SPECIAL PART

When answering questions about private microbiology, we recommend that you adhere to the following plan:

1. Taxonomy of the pathogen:
for bacteria - department, family, genus, species; for eukaryotes - classes, types;
for viruses - DNA or RNA - genomic viruses, family, genus, species, serogroup.
2. Characteristics of the pathogen: morphological, tinctorial, cultural, biochemical, genetic, antigenic properties of pathogenicity, resistance to various factors, biological models.
3. Caused diseases - brief epidemiological characteristics (sources of infection, mechanism, ways and factors of transmission, susceptible collective) pathogenesis, main clinical manifestations, features of immunity.
4. Microbiological diagnostics: the test material, the diagnostic methods used.
5. Specific prophylaxis and etiotropic treatment (vaccines, serums, phages, chemotherapy).

PRIVATE MICROBIOLOGY

1. Methods of microbiological diagnostics of infectious diseases.
2. Pathogens of typhoid and paratyphoid. Taxonomy and characteristics. Microbiological diagnostics. Specific therapy.
3. Pathogens of Escherichiosis. Taxonomy and characteristics. Microbiological diagnostics. Treatment.
4. Pathogens of intestinal Yersiniosis. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.

5. The causative agents of Shigellosis. Taxonomy and characterization. Microbiological diagnostics. Specific prevention and treatment.
6. The causative agents of Salmonellosis. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
7. The causative agents of Cholera. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
8. Staphylococcus. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
9. Streptococcus. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
10. Meningococcus. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
11. Gonococcus. Taxonomy and characteristics. Microbiological diagnostics. Treatment.
12. The causative agent of Tularemia. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
13. The causative agent of Anthrax. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
14. The causative agent of Brucellosis. Taxonomy and characterization. Microbiological diagnostics. Specific prevention and treatment.
15. The causative agent of Plague. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
16. Features of microbiological diagnosis in quarantine infections. Express-diagnostic.
17. The causative agents of gas anaerobic infection. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
18. The causative agent of Botulism. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
19. Causative agent of Tetanus. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
20. Causative agent of Diphtheria. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
21. The causative agent of Whooping cough and Parapertussis. Taxonomy and characteristics. Microbiological diagnostics. Specific prevention and treatment.
22. The causative agents of Tuberculosis. Taxonomy, characteristics. Opportunistic mycobacteria. Microbiological diagnostics. Specific prophylaxis and treatment.
23. Causative agent of Spotted fever. Taxonomy, Characteristics. Brill-Zinsser's disease. Microbiological diagnostics. Specific prevention and treatment
24. The causative agent of Q-fever. Taxonomy, characteristics, microbiological diagnostics. Specific prevention and treatment.
25. The causative agent of Chlamydia. Taxonomy, characteristics, microbiological diagnostics. Specific prevention and treatment.
26. The causative agents of Legionellosis. Taxonomy, characteristic, microbiological diagnostics. Treatment.
27. The causative agent of Syphilis. Taxonomy. Characteristic. Microbiological diagnosis and treatment.
28. Causative agent of Leptospirosis. Taxonomy, characteristics. Microbiological diagnostics. Specific prevention and treatment.
29. The causative agents of relapsing fever. Taxonomy. Characteristic. Microbiological diagnostics and treatment.
30. The role of opportunistic microorganisms in the occurrence of nosocomial diseases infections. Clinical microbiology, its tasks.
31. Pseudomonas aeruginosa. Taxonomy. Characteristic. Microbiological diagnosis and treatment.
32. Non-spore-forming anaerobes. Taxonomy. Characteristic. Microbiological diagnostics and treatment.
33. Classification of fungi. Characteristic. Role in human pathology. Laboratory diagnostics and treatment.
34. The causative agents of Malaria. Taxonomy. Characteristic. Microbiological diagnostics and treatment.
35. The causative agent of Toxoplasmosis. Taxonomy. Characteristic. Microbiological diagnostics and treatment.
36. Causative agents of Leishmaniasis. Taxonomy. Characteristics. Microbiological diagnosis. Treatment
37. Significance of D.I. Ivanovsky's discovery. Stages of Virology development. Role of Russian scientists in the development of Virology.
38. ARVI Pathogens. Taxonomy. Characteristic. Laboratory diagnostics. Specific prevention and treatment.
39. The causative agent of Influenza. Taxonomy. Characteristic. Laboratory diagnostics and treatment.
40. The causative agents of Poliomyelitis. Taxonomy. Characteristic. Laboratory diagnostics. Specific prevention.
41. Pathogens of Hepatitis A and E. Taxonomy. Characteristic. Laboratory diagnostics. Specific prophylaxis.
42. The Arboviruses. Taxonomy. Characteristic. Laboratory diagnostics. Specific prophylaxis.
43. Causative agent of Tick-borne Encephalitis. Taxonomy. Characteristic. Laboratory diagnostics. Specific prophylaxis.
44. The causative agent of Rabies. Taxonomy. Characteristic. Laboratory diagnostics. Specific prophylaxis.
45. Causative agent of Smallpox. Taxonomy. Characteristics. Laboratory diagnostics. Specific prevention of smallpox at the present stage.
46. The causative agent of Rubella. Taxonomy. Characteristics, Laboratory diagnostics. Specific prophylaxis.

47. The Measles virus. Taxonomy. Characteristics, Laboratory diagnostics. Specific prophylaxis.
48. Herpes infection. Taxonomy. Characteristic. Laboratory diagnostics. Specific prevention. Treatment.
49. Pathogens of Hepatitis B, C, and D. Taxonomy. Characteristic. Carriage. Laboratory diagnostics. Specific prophylaxis.
50. HIV infection. Taxonomy. Characteristic. Laboratory diagnostics. Specific prophylaxis.
51. Classification and characteristics of Oncogenic viruses.

SANITARY MICROBIOLOGY

1. The doctrine of sanitary indicative microorganisms
2. Air microflora and methods of its study
3. Pathogenic microbes in the air, mechanisms of spread and transmission of infection
4. Sanitary indicative air microorganisms.
5. Sanitary-bacteriological examination of air. Methods. Equipment.
6. Microflora of water. Factors affecting the number of microbes in water.
7. Methods of sanitary and bacteriological research of water.
8. Indicators of water quality: microbial number, coli-titer, coli-index.
9. Determination of the coli-titer of water by the fermentation method.
10. Study of drinking water for the presence of pathogens of typhoid fever, cholera and leptospirosis
11. Soil microflora. Factors affecting the quantitative and species composition of soil microbes.
12. Soil as a factor in the transmission of infectious diseases.
13. Sanitary and microbiological study of soil. Microbial number, coli-titer, perfringens-titer of soil.
14. Sanitary and bacteriological examination of environmental objects, hand washes, inventory, equipment.
15. Control of the dressing material for sterility.
16. The value of opportunistic microbes in the etiology of foodborne toxicoinfections.
17. Sanitary and microbiological examination of food products.
18. Sanitary and microbiological examination of milk and dairy products.
19. Sanitary and microbiological research in case of food toxicoinfections and bacterial toxicosis.
20. Sanitary and bacteriological examination of meat and meat products.
21. Viruses circulating in wastewater, methods of indication.
22. The role of the air in the spread of viral diseases, methods of air sampling and indication of viruses.