Ministry of Health Care, Republic of Belarus
Vitebsk State Medical University
Department of Microbiology

INSTRUCTIONS

FOR LABORATORY TRAINING

in Special Microbiology & Virology
for students of medical faculty

VITEBSK 2005

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Reviewed by:
I.I. Generalov, MD, Dr.Sci, Professor, Head of Microbiology Dpt,
Vitebsk State Medical University

Zheleznyak N.V.
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Instructions for laboratory training in Special Microbiology and Virology for students of medical faculty are prepared according to basic educational plan and program, proved by Ministry of Health Care of Republic of Belarus. The instructions include the working plan, schedule of practical training and basic practical skills in special microbiology and virology.

The instructions are prepared for students of medical faculties of high medical educational establishments.

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CONTENTS

Practical classes №1

The topic: ***Microbial genetics***

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get skills of elaborating transformation and transduction tests.
3. To be able to assess phenotypic variation of *Proteus* culture.
4. To be able to determine R- and S-forms of microbial colonies.

The questions to the topic:

1. Genotype, phenotype, their characteristics. Organization of bacterial genome.
2. Plasmids and episomes, their structure and function.
3. Mobile genetic elements of bacterial genome. Transposons, IS-sequences.
4. Phenotypic bacterial variations. Modifications, their characteristics.
5. Genotypic forms of bacterial variation, their classification. Bacterial dissociation.
6. Mutations, their characteristics.
7. Bacterial recombinations, general characteristics and mechanism.
8. Transformation
9. Tranduction
10. Conjugation
11. Methods of molecular genetic analysis. Molecular hybridization of nucleic acids.
12. Polymerase chain reaction. DNA and RNA sequencing.
13. Principles of genetic engineering. Applications of recombinant technologies in biology and medicine.

THE LITERATURE:

1. Lecture material.
2. "General Microbiology & Essential Immunology: Lecture Course". I. I. Generalov, 2005, p. 83-102.
3. "Laboratory training course in microbiology". L.B. Borisov, 1984, p. 68-75.
4. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 56-58.

Original work of students:

1. Transformation test of B. subtilis culture.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	1. DNA of auxoautotrophic strain, capable of tryptophan synthesis. 2. Recipient culture of auxoheterotrophic *B. subtilis* strain.	Preparation of bacterial suspension of *B. subtilis* strain from slant agar culture by saline washing. Two test tubes are used. 0.5 ml of bacterial suspension are poured into both test tubes. Experimental test tube is supplemented with 0.5 ml of DNA solution, control test tube – with 0.5 ml of saline. Incubation in thermostat at 37°C for 30 min Plating of the material from both test tubes onto Petri dish containing agar without tryptophan.	—
Incubation in thermostat at 37°C for 24 h			
2.		Evaluation of transformation results.	
Conclusion:			

2. Transduction test of E. coli biovar paracoli culture.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	1. Bacteriophage, able to transduce lactose utilization. 2. Recipient culture of *E. coli* biovar *paracoli*, which cannot utilize lactose.	Preparation of bacterial suspension of *E. paracoli* strain from slant agar culture by saline washing. Two test tubes are used. 0.5 ml of bacterial suspension are poured in both test tubes. Experimental test tube is supplemented with 0.5 ml of phage culture, control test tube – with 0.5 ml of saline. Incubation in thermostat at 37°C for 30 min Plating of the material from both test tubes onto Petri dish with Endo medium.	—
Incubation in thermostat at 37°C for 24 h			
2.		Evaluation of transduction results.	
Conclusion:			

3. Examination of modification of P. vulgaris culture.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	1. Culture of *P. vulgaris*. 2. Petri dish with MPA. 3. Petri dish with MPA supplemented with phenol.	One-streak plating of *P. vulgaris* culture on Petri dish with MPA and Petri dish with phenol-supplemented MPA.	—
Incubation in thermostat at 37°C for 24 h			
2.		Evaluation of microbial growth both on experimental and control Petri dishes.	
Conclusion:			

Practical classes №2

The topic: ***Causative agents of suppurative infections. Staphylococci, pseudomonads, bacteroids and related agents***

The main aim and the tasks of the work:

1. To learn the taxonomy of different cocci, and the role of various staphylococci representatives in human pathology.
2. To know the methods of laboratory diagnosis of staphylococcal infections.
3. To know the properties of pseudomonads and bacteroids, their role in the development of human infections.
4. To know the principles of laboratory diagnosis of pseudomonad and bacteroidal infections.

The questions to the topic:

1. Classification, structure and properties of staphylococci.
2. Virulence factors of staphylococci.
3. Pathogenesis and clinical findings in staphylococcal infections.
4. Laboratory diagnosis of staphylococcal infections, specific prophylaxis and treatment.
5. *Pseudomonas aeruginosa*: classification, structure and properties.
6. Pathogenesis and clinical findings in infections caused by *Pseudomonas aeruginosa*. Laboratory diagnosis, prophylaxis and treatment.
7. Classification of pathogenic gram-negative non-sporeforming anaerobes. Structure and properties of bacteroids, prevotellae, porphyromonads.
8. Pathogenesis and clinical findings in bacteroidal infections. Laboratory diagnosis, prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 5-17.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 109-112.

Personal work of students:

1. Laboratory investigation of pus.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	The pus taken from patient's abscess.	Microscopy of Gram-stained pus smear. Plating of pus on blood agar and yolk-salt agar.	—
2.		Evaluation of microbial growth on blood agar and yolk-salt agar. Inoculation of material from hemolytic lecitinase-positive colony on the slant agar.	
3.		Determination of coagulase activity of isolated culture. Mannitol fermentation testing. Antibiotic susceptibility testing of isolated culture.	
4.		Evaluation of mannitol fermentation test. Evaluation of the results of antibiotic susceptibility test.	1. _____mm. 2. _____mm. 3. _____mm. 4. _____mm. 5. _____mm.

Conclusion:

2. Laboratory investigation of nasopharyngeal swab.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	Nasopharyngeal swab.	Planting of the material on Petri dish with blood agar.	—
2.		Evaluation of microbial growth on blood agar. Microscopy of Gram-stained smear.	

Conclusion:

3. ***Demonstration***: preparations for diagnosis, specific prophylaxis and treatment of staphylococcal infections – staphylococcal toxoid, anti-staphylococcal donor's immunoglobulin, type-specific staphylococcal bacteriophages.

Practical classes №3

The topic: ***Causative agents of suppurative and wound infections: streptococci and clostridia***

The main aim and the tasks of the work:

1. To learn the taxonomy of streptococci, and the role of various streptococcal species in human pathology.
2. To know the methods of laboratory diagnosis of streptococcal infections.
3. To know the basic properties of clostridia and their role in the development of gas gangrene.
4. To learn the principles of laboratory diagnosis of gas gangrene.
5. To know etiology, pathogenesis, clinical findings, laboratory diagnosis, specific prophylaxis and treatment of tetanus.

The questions to the topic:

1. Classification, structure and properties of streptococci.
2. Virulence factors of streptococci.
3. Pathogenesis and clinical findings in streptococcal infections.
4. Laboratory diagnosis of streptococcal infections. Differential diagnosis of *S. pyogenes*, *S. agalactiae*, *S. pneumoniae*, *Enterococcus spp.* Specific prophylaxis and treatment of streptococcal infections.
5. Classification, structure and properties of clostridia.
6. Virulence factors of clostridia – causative agents of gas gangrene.
7. Pathogenesis and clinical findings in gas gangrene. Laboratory diagnosis, prophylaxis and treatment.
8. Structure and properties of *C. tetani*.
9. Pathogenesis and clinical findings in tetanus. Laboratory diagnosis, specific prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 18-34.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 112-115, 145-149.

Personal work of students:

1. Laboratory investigation of nasopharyngeal swab (continuation). Evaluation of microbial growth on blood agar. Microscopy of Gram-stained smear.

2. Indirect hemagglutination test for perfringens toxin determination in the serum of patient with gas gangrene.

Reagents	Patient's serum dilutions				
	1:2	**1:4**	**1:8**	**1:16**	**Control**
Saline	0,4	0,4	0,4	0,4	0,4
Patient's serum	0,4 →	0,4 →	0,4 →	0,4	-
Erythrocyte anti-perfringens diagnosticum	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h				
Results:				↓	

Conclusion

3. *Demonstration*: microscopy of smears with pneumococci (Gram stain); *C: tetani* (Gram stain); *C. perfringens* (Gram stain).

4. *Demonstration*: preparations for diagnosis, specific prophylaxis and treatment of tetanus and gas gangrene – ADPT vaccine, tetanus toxoid, anti-tetanus donor's immunoglobulin, erythrocyte anti-perfringens diagnosticum.

Practical classes №4

The topic: ***Pathogenic enterobacteria: Escherichia coli and shigellae***

The main aim and the tasks of the work:

1. To learn general characteristics of *Enterobacteriaceae* family.
2. To learn main properties of *Escherichia coli* and its role in human pathology.
2. To know the methods of laboratory diagnosis of coli-infections.
3. To know the basic properties of shigellae.
4. To learn the role of shigellae in human pathology, pathogenesis, clinical findings and laboratory diagnosis of shigelloses.

The questions to the topic:

1. Classification, structure and properties of *Escherichia coli.*
2. Specific and non-specific *Escherichia coli* infections.
3. Enteropathogenic and enterotoxigenic *E. coli* infections: pathogenesis and clinical findings.
4. Enteroaggregative, enteroinvasive and enterohemorrhagic *E. coli* infections: pathogenesis and clinical findings of diseases.

5. Laboratory diagnosis of escherichioses. Specific prophylaxis and treatment of escherichioses.
6. Classification, structure and properties of shigellae.
7. Virulence factors of shigellae.
8. Pathogenesis and clinical findings in shigellosis.
9. Laboratory diagnosis, prophylaxis and treatment of shigellosis.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 35-47.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 120-123.

Personal work of students:

1. Laboratory investigation of coli-enteritis.

Day of investigation	Material for investigation	Steps of investigation	Results
1.	Patient's feces.	Plating of material onto EMB (eosin-methylene blue) medium.	—
2.		Evaluation of microbial growth on EMB agar. Slide tentative agglutination reaction with polyspecific OK(B) antiserum. Inoculation of material from positive colony on the slant agar.	
3.		Evaluation of microbial growth on slant agar. Slide tentative agglutination reaction with monospecific OK(B) antisera: $O_{111}K_{58}$, $O_{55}K_{59}$, $O_{20}K_{84}$, $O_{26}K_{60}$. Extended agglutination reaction with monospecific OK(B) antiserum. Inoculation of isolated culture into Hiss media	
4.		Evaluation of biochemical properties of isolated culture	G | L | Mn | S | M | Indole | H_2S

Conclusion:

2. *Demonstration*: biopreparations for diagnosis of coli-enteritis and shigelloses: microbial diagnosticums and specific antisera.

Practical classes №5

The topic: ***Pathogenic Salmonellae***

The main aim and the tasks of the work:

1. To learn the common properties of salmonellae.
2. To learn main steps of pathogenesis of enteric fever and other salmonelloses.
3. To know the methods of laboratory diagnosis of enteric fever.
4. To get skills of serologic testing in typhoid fever.
4. To know the methods of laboratory diagnosis of food poisoning (salmonella toxinfection).
5. To know the principles of prophylaxis and treatment of enteric typhoid fever and salmonelloses.

The questions to the topic:

1. Classification, structure and main properties of salmonellae.
2. Antigenic structure of salmonellae. Kauffmann and White classification.
3. Virulence factors of salmonellae.
4. Pathogenesis and clinical findings in enteric fever.
5. Pathogenesis and clinical findings of salmonelloses.
6. Laboratory diagnosis of enteric typhoid fever.
7. Laboratory diagnosis of food poisoning and other salmonelloses.
8. Specific prophylaxis and treatment of enteric typhoid fever and salmonelloses.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 48-56.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 119-120, 143-145.

Personal work of students:

1. Hemoculture investigation in enteric typhoid fever.

Day of investigation	Material for investigation	Steps of investigation	Results						
1.	Patient's blood	Inoculation of 5 ml of blood into 50 ml of bile salt broth.	—						
2.		Evaluation of microbial growth on bile salt broth. Planting of material from bile salt broth onto EMB agar.							
3.		Evaluation of microbial growth on EMB agar. Planting of material from lactose-negative colorless colony into Russel medium.							
4.		Evaluation of microbial growth on Russel medium. Slide tentative agglutination reaction with specific H-antisera to *S. typhi* and *S. paratyphi B* (*S. schottmuelleri*). Inoculation of isolated culture into Hiss media							
5.		Evaluation of biochemical properties of isolated culture	G	L	Mn	S	M	Indole	H_2S

Conclusion:

2. Widal agglutination reaction for serologic diagnosis of typho-paratyphoidal diseases.

Reagents	Serum dilutions				
	1:100	1:200	1:400	1:800	K
Saline	1,0	1,0	1,0	1,0	1,0
Patient's serum, diluted 1:50	1,0 →	1,0 →	1,0 →	1,0	-
Microbial diagnosticum	3 drops into every test tube				
Incubation in thermostat at 37°C for 24 h					
Results:					
Conclusion:					

3. Demonstration: biopreparations for diagnosis of typho-paratiphoidal diseases and salmonelloses: microbial diagnosticums and specific antisera.

Practical classes №6

The topic: ***Pathogenic vibrios – causative agents of cholera. Pathogenic Yersiniae. Causative agent of botulism***

The main aim and the tasks of the work:

1. To know the common properties of vibrios.
2. To learn main steps of cholera pathogenesis.
3. To know the methods of laboratory diagnosis of cholera.
4. To known general properties of yersiniae.
5. To learn pathogenesis and laboratory diagnosis of yersinioses.
6. To get skills of serologic testing in yersinioses.
7. To know.the properties of botulism causative agent, pathogenesis, laboratory diagnosis, prophylaxis and treatment of botulism

The questions to the topic:

1. Classification, structure and properties of vibrios.
2. Virulence factors of cholera vibrios
3. Pathogenesis and clinical findings in cholera.
4. Laboratory diagnosis of cholera, specific prophylaxis and treatment of the disease.
5. Classification, structure and basic properties of yersiniae.
6. Pathogenesis and clinical findings in yersinioses.
7. Laboratory diagnosis of yersinioses, specific prophylaxis and treatment.
8. Classification and properties of *C. botulinum.*
9. Pathogenesis and clinical findings in botulism.
10. Laboratory diagnosis of botulism, prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 57-71.
3. "Practical work in medical microbiology". A. Pavlovich, 1993.

Personal work of students:

1. Serologic diagnosis of yersiniosis.

Reagents	Patient's serum dilutions					
	1:20	1:40	1:80	1:160	1:320	K
	1	2	3	4	4	5
Saline	0,4	0,4	0,4	0,4	0,4	0,4
Patient's serum, diluted 1:10	0,4 →	0,4 →	0,4 →	0,4 →	0,4	-
Erythrocyte antigenic yersinia diagnosticum	0,4	0,4	0,4	0,4	0,4	0,4
Incubation at 37°C for 1-2 h						
Results						
Conclusion:						

2. Demonstration: biopreparations for diagnosis and treatment of cholera, yersinioses, and botulism: microbial diagnosticums and specific antisera.

3. Demonstration: microscopy of smears with cholera vibrios (Gram stain).

Practical classes №7

The topic: *final classes of section "Medical bacteriology"*

The main aim and the tasks of the work:

To summarize the data of most significant bacterial infections, to learn major diseases of bacterial origin and methods of their laboratory diagnosis, prophylaxis and treatment.

The questions to the topic:

1. Staphylococci: classification, structure and properties. Virulence factors of staphylococci.
2. Pathogenesis and clinical findings in staphylococcal infections. Laboratory diagnosis, specific prophylaxis and treatment.
3. *Pseudomonas aeruginosa*: classification, structure and properties. Pathogenesis and clinical findings in *Pseudomonas aeruginosa* infections. Laboratory diagnosis, prophylaxis and treatment.
4. Classification of pathogenic gram-negative non-sporeforming anaerobes. Structure and properties of bacteroids, prevotellae, porphyromonads. Bacteroidal infections. Laboratory diagnosis, prophylaxis and treatment.
5. Streptococci: classification, structure and properties. Virulence factors of streptococci.

6. Pathogenesis and clinical findings in streptococcal infections. Laboratory diagnosis. Differential diagnosis of *S. pyogenes*, *S. agalactiae*, *S. pneumoniae*, and *Enterococcus spp.* Specific prophylaxis and treatment of streptococcal infections.

7. Classification, structure and properties of clostridia. Virulence factors of clostridia – causative agents of gas gangrene.

8. Pathogenesis and clinical findings in gas gangrene. Laboratory diagnosis, prophylaxis and treatment.

9. Structure and properties of *C. tetani*. Virulence factors.

10. Pathogenesis and clinical findings in tetanus. Laboratory diagnosis, specific prophylaxis and treatment.

11. Classification and properties of *C. botulinum*. Botulotoxin – properties, mechanism of action.

12. Pathogenesis and clinical findings in botulism. Laboratory diagnosis, prophylaxis and treatment.

13. Classification, structure and properties of *Escherichia coli*. Non-specific *Escherichia coli* infections.

14. Enteropathogenic, enterotoxigenic, enteroaggregative, enteroinvasive and enterohemorrhagic *E. coli*: pathogenesis and clinical findings of diseases.

15. Laboratory diagnosis of escherichioses. Prophylaxis and treatment.

16. Shigellae: classification, structure and properties. Virulence factors.

17. Pathogenesis and clinical findings in shigelloses. Laboratory diagnosis, prophylaxis and treatment.

18. Salmonellae: classification, structure and properties. Antigenic structure. Kauffmann and White scheme of salmonella typing. Virulence factors.

19. Pathogenesis and clinical findings in enteric fever. Laboratory diagnosis, specific prophylaxis and treatment.

20. Pathogenesis and clinical findings in salmonelloses. Laboratory diagnosis of salmonelloses, specific prophylaxis and treatment.

21. Classification, structure and properties of vibrios. Virulence factors of cholera vibrios.

22. Pathogenesis and clinical findings in cholera. Laboratory diagnosis, specific prophylaxis and treatment of cholera.

23. Classification, structure and basic properties of yersiniae.

24. Pathogenesis and clinical findings in yersinioses. Laboratory diagnosis, prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 5-71.
3. "Practical work in medical microbiology". A. Pavlovich, 1993.

Demonstration material: Widal tube agglutination test, Vi-hemagglutination test for enteric fever carriage detection, nutrient media for pathogenic bacteria cultivation, preparations for immunodiagnostics, immunoprophylaxis and immunotherapy of bacterial infections.

Practical classes №8

The topic: ***Causative agents of bacterial respiratory infections: meningococci, bordetellae, mycoplasmas***

The main aim and the tasks of the work:

1. To learn a theoretical knowledge of the topic.
2. To learn the methods of laboratory diagnosis of meningococcal infections.
3. To renew the skills of precipitation reaction technique for determination of meningococcal antigen in cerebrospinal fluid.
4. To learn the methods of laboratory diagnosis of whooping cough disease.
5. To learn the role of mycoplasmas in human pathology, clinical findings and laboratory diagnosis of mycoplasmal pneumonias.
6. To renew the skills of indirect hemagglutination test for laboratory diagnosis of mycoplasmal pneumonia.

The questions to the topic:

1. Meningococci, taxonomy, properties.
2. Virulence factors of meningococci. Pathogenesis of meningococcal diseases. Immunity.
3. Laboratory diagnosis of meningococcal infections. Specific prophylaxis and treatment.
4. Classification, structure and properties of bordetellae.
5. Bordetellae virulence factors. Pathogenesis of whooping cough. Immunity.
6. Laboratory diagnosis, prophylaxis and treatment of whooping cough.
7. Pathogenic mycoplasmas, classification and properties.
8. Virulence factors of mycoplasmas. Pathogenesis of mycoplasmal pneumonia. Immunity.
9. Laboratory diagnosis, prophylaxis and treatment of mycoplasmal pneumonias.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 72-84.

3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 107-109, p. 138-140.

Personal work of students:

1. Serologic diagnosis of mycoplasmal pneumonia in paired sera test.

Reagents	Serum dilutions						Control
	1:10	1:20	1:80	1:160	1:320	1:640	
	1	2	3	4	5	6	7
Saline	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Patient's serum I, 1/5	0,4	0,4	0,4	0,4	0,4	0,4	
Patient's serum II, 1/5	0,4	0,4	0,4	0,4	0,4	0,4	
Erythrocyte mycoplasmal antigenic diagnosticum	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h						
Results:							
Serum I							
Serum II							
Conclusion:							

2. Ring precipitation reaction for determination of meningococcal antigens in cerebrospinal fluid.

Reagents: 1) *Patient's liquor.*
2) *Meningococcal precipitating serum.*
3) *Pneumococcal precipitating serum.*

Reaction steps:
1. 1 ml of serum for precipitation of meningococcal antigens is dropped into the test tube N1.
2. 1 ml of liquor is layed carefully on the serum surface.
3. The same manipulation is made with test tube N2, where the serum for precipitation of pneumococcal antigens is used.
4. Incubation for 10 min at room temperature. Ring of precipitation is to be formed.
5. Drawing of the results.

3. *Demonstration*: microscopy of patient's liquor smear with meningococci. Gram stain.

Practical classes №9

The topic: ***Mycobacterium tuberculosis. Corynebacterium diphtheria***

The main aim and the tasks of the work:

1. To learn theoretical knowledge of the topic
2. To be able to detect pathogenic mycobacteria and corynebacteria in smears from clinical specimens.
3. To know the methods of laboratory diagnosis of tuberculosis and diphtheria.
4. To get skills of *C. diphtheriae* toxigenicity determination.

The questions to the topic:

1. Classification of mycobacteria. Epidemiology of tuberculosis.
2. Structure and properties of pathogenic mycobacteria.
3. Pathogenesis and clinical findings in tuberculosis.
4. Laboratory diagnosis of tuberculosis.
5. Specific treatment and prophylaxis of tuberculosis.
6. Classification, structure and properties of *C. diphtheriae*.
7. Virulence factors of *C. diphtheriae*, mechanism of action of diphtheria exotoxin.
8. Pathogenesis and clinical findings in diphtheria.
9. Laboratory diagnosis of diphtheria.
10. Specific treatment and prophylaxis of diphtheria.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 85-101.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p.150-158.

Personal work of students:

1. Demonstration: a) microscopy of smears with *Corynebacterium diphteriae* (Neisser stain);
b) microscopy of smears with *M. tuberculosis* (Ziehl-Neelsen stain);
c) microscopy of smears with *M. tuberculosis* micro-colonies – cord-factor detection (Ziehl-Neelsen stain).

2. Demonstration: biopreparations for diagnosis, specific prophylaxis and treatment of diphtheria and tuberculosis.

Practical classes №10

The topic: ***Causative agents of bacterial zoonoses (plague, anthrax, brucellosis, and tularemia)***

The main aim and the tasks of the work:

1. To learn theoretical knowledge of the topic
2. To be able to detect pathogenic yersiniae, brucellae, francisellae and anthracoides bacilli in smears from clinical specimens.
3. To know the methods of laboratory diagnosis of plague, anthrax, brucellosis, and tularemia.
4. To get skills of serologic diagnosis of brucellosis (Huddleson and Wright agglutination reactions)..

The questions to the topic:

1. Classification, structure and properties of *Y. pestis*.
2. Virulence factors of *Y. pestis*. Pathogenesis and clinical findings in plague.
3. Laboratory diagnosis of plague, specific prophylaxis and treatment of the disease.
4. Classification, structure and properties of *B. anthracis*.
5. Virulence factors of *B. anthracis*. Pathogenesis and clinical findings in anthrax.
6. Laboratory diagnosis of anthrax, specific prophylaxis and treatment.
7. Structure and properties of brucellae.
8. Pathogenesis and clinical findings in brucellosis.
9. Laboratory diagnosis of brucellosis, specific prophylaxis and treatment.
10. Structure and properties of *F. tularensis*.
11. Pathogenesis and clinical findings in tularemia.
12. Laboratory diagnosis of tularemia, specific prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 102-120.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p.125-127, p.132-135, p.140-143.

Personal work of students:

1. Demonstration: a) microscopy of smears with *Y. pestis* (methylene blue stain); b) microscopy of smears with *B. anthracis* (Gram stain); c) microscopy of

smears with *F. tularensis* (Gram stain); d) microscopy of smears with *B. abortus* (Gram stain);

2. Demonstration: biopreparations for diagnosis, specific prophylaxis and treatment of plague, anthrax, brucellosis, and tularemia.

3. Tentative slide agglutination test (Huddleson reaction) for serologic diagnosis of brucellosis.

Reagents	Specimen			Control	
				Serum	Antigen
Patient's serum	0,04	0,02	0,01	0,02	-
Brucella microbial diagnosticum	0,03	0,03	0,03	-	0,03
Saline	-	-	-	0,03	0,03
Results					
Conclusion:					

4. Extended agglutination test (Wright reaction) for serologic diagnosis of brucellosis.

Reagents	Serum dilutions					
	1:100	1:200	1:400	1:800	1:1600	K
Saline	1,0	1,0	1,0	1,0	1,0	1,0
Patient's serum	1,0	1,0	1,0	1,0	1,0	-
Brucella microbial diagnosticum	3 drops into every test tube					
Results						
Conclusion:						

Practical classes №11

The topic: ***Causative agents of sexually transmitted diseases (syphilis, gonorrhoea, urogenital chlamydioses and mycoplasmoses)***

The main aim and the tasks of the work:

1. To learn theoretical knowledge of the topic
2. To know the properties of *T. pallidum*, and the methods of laboratory diagnosis, treatment and prophylaxis of syphilis.
3. To be able to apply Wasserman complement fixation test for serologic diagnosis of syphilis.
4. To know how to use microscopy for detection of treponemas, gonococci and chlamydiae in patient's specimens.

The questions to the topic:

1. Classification, structure and properties of treponemas.
2. Pathogenesis and clinical findings in syphilis.
3. Laboratory diagnosis of syphilis, treatment and prophylaxis of the disease.
4. Classification, structure and properties of *Neisseria gonorrhoeae*.
5. Pathogenesis and clinical findings in gonorrhoea, laboratory diagnosis, treatment and prophylaxis of the disease.
6. Classification, structure and properties of pathogenic chlamydiae.
7. Pathogenesis and clinical findings in chlamydial urogenital infections, laboratory diagnosis, prophylaxis and treatment of the diseases.
8. Classification, structure and properties of uropathogenic mycoplasmas.
9. Pathogenesis and clinical findings in mycoplasmal urogenital infections, laboratory diagnosis, prophylaxis and treatment of the diseases.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 121-136.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 106-107, 160-164, 170-171.

Personal work of students:

***1. Demonstration*:** a) microscopy of smears with *T. pallidum* (Giemsa stain); b) microscopy of smears with chlamidiae (Giemsa stain); c) microscopy of smears with incomplete phagocytosis of *N. gonorrhoeae* (methylene blue stain).

***2. Demonstration*:** biopreparations for diagnosis, specific prophylaxis and treatment of syphilis and gonorrhoea.

3. Wasserman reaction for serologic diagnosis of syphilis.

Reagents	Serum dilutions							Controls		
	1:10	1:20	1:40	1:80	1:160	1:320	1:640	Hemol. system	Ag	Compl.
	1	2	3	4	5	6	7	8	9	10
Patient serum	0,2	0,2	0,2	0,2	0,2	0,2	0,2			
Specific treponemal antigen in working dose	0,2	0,2	0,2	0,2	0,2	0,2	0,2		0,2	
Complement in working dose	0,2	0,2	0,2	0,2	0,2	0,2	0,2		0,2	0,2
Saline								0,6	0,2	0,4
Incubation	at 37°C 1 h or at 4°C 18-20 h									
Hemolytic system	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C 1 h									
Results:										
Conclusion:										

Results are tested after control probes evaluation (test tubes NN 8, 9, 10).
***Hemolysis absence* means *positive* complement fixation test result.**

Practical classes №12

The topic: ***Pathogenic borreliae, leptospirae, rickettsiae and coxiellae. Laboratory diagnosis of relapsing fever, Lyme disease, leptospirosis, epidemic typhus, Q fever***

The main aim and the tasks of the work:

1. To learn theoretical knowledge of the topic
2. To know the properties of borreliae, leptospirae, rickettsiae and coxiellae.
3. To know the methods of laboratory diagnosis, treatment and prophylaxis of relapsing fever, Lyme disease, leptospirosis, epidemic typhus, Q fever.
4. To be able to elaborate indirect hemagglutination assay to differentiate primary epidemic typhus and Brill-Zinsser disease.

The questions to the topic:

1. Classification, structure and common properties of borreliae.
2. Pathogenesis, clinical findings and laboratory diagnosis of relapsing fevers.
3. Pathogenesis, clinical findings and laboratory diagnosis of Lyme disease.
4. Classification, structure and properties of leptospirae.
5. Pathogenesis, clinical findings and laboratory diagnosis of leptospirosis.
6. Classification, structure and properties of rickettsiae.
7. Pathogenesis and clinical findings in rickettsioses.
8. Laboratory diagnosis, prophylaxis and treatment of epidemic and endemic typhus.
9. Classification, structure and properties of *Coxiella burnetii*.
10. Pathogenesis and clinical findings in Q fever. Laboratory diagnosis, prophylaxis and treatment of the disease.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 137-160.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 166-170.

Personal work of students:

I. Demonstration: a) microscopy of smears with *B. recurrentis* in patient's blood (Giemsa stain); b) microscopy of smears with *R. provazekii* in infected tissues (Zdrodovsky stain).

2. Demonstration: biopreparations for diagnosis, specific prophylaxis and treatment of leptospirosis, borrelioses and rickettsioses.

3. Indirect hemagglutination test for serologic differentiation of primary epidemic typhus and Brill-Zinsser disease.

Reagents	Serum dilutions						Control
	1:10	1:20	1:80	1:160	1:320	1:640	
	1	2	3	4	5	6	7
Saline	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Patient's serum I without cysteine, 1/5	0,4	0,4	0,4	0,4	0,4	0,4	
Patient's serum II treated with cysteine, 1/5	0,4	0,4	0,4	0,4	0,4	0,4	
Erythrocyte rickettsial antigenic diagnosticum	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h						
Results:							
Serum I							
Serum II							
Conclusion:							

Practical classes №13

The topic: *General virology: morphology and physiology of viruses*

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get acquaintance with structure and physiology of viruses
3. To know the methods of virus cultivation.
4. To know the methods of virus detection in the embryonated chicken eggs and in the cell cultures.
5. To get skills of hemagglutination test for viral indication and titration.
6. To get skills of viral detection in the cell cultures by hemadsorption, symplast formation and by "color reaction".

The questions to the topic:

1. General characteristics of viruses.
2. Classification of viruses.
3. Structure of viruses.

4. Viral genomic organization.
5. Virus replication cycle.
6. Outcomes of viral infections
7. Laboratory diagnosis of viral infections. Detection (indication) and identification of viruses in the embryonated chicken eggs.
8. Different types of cell cultures. Indication and identification of viruses in the cell cultures.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 162-174.
3. "Laboratory training course in microbiology". L.B. Borisov, 1984, p. 56-63.
4. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 56-58.

Original work of students:

1. Inoculation of the virus-containing material into the embryonated chicken eggs into the chorioallantoic membrane, allantoic and amnion cavity.

2. Hemagglutination test for the indication and titration of the virus.

Reagents	Allantoic fluid dilutions						Control
	1:5	1:10	1:20	1:80	1:80	1:160	
	1	2	3	4	5	6	7
Saline	0,8	0,4	0,4	0,4	0,4	0,4	0,4
Allantoic liquid	0,2	0,4	0,4	0,4	0,4	0,4	-
Erythrocyte suspension	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h						
Results:							
Conclusion:							

3. Microscopy of the cell culture smears with symplast in measles (demonstration).

4. Microscopy of the hemadsorption reaction.

Practical classes №14

The topic: ***Orthomyxoviruses. Paramyxoviruses. Coronaviruses***

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get acquaintance with the methods of laboratory diagnosis of influenza, parainfluenza, mumps, measles, respiratory syncytial viral infections.
3. To know preparations for diagnostics, specific prophylaxis and treatment of viral diseases.

The questions to the topic:

1. Influenza viruses, classification, structure and properties, viral replication cycle.
2. Pathogenesis and clinical findings in influenza. Laboratory diagnosis of disease.
3. Specific prophylaxis and treatment of influenza.
4. Paramyxoviruses. Classification, general characteristics, replication cycle.
5. Pathogenesis and clinical findings in parainfluenza. Laboratory diagnosis of disease, specific prophylaxis and treatment.
6. Pathogenesis and clinical findings in measles and mumps. Laboratory diagnosis of the diseases, specific prophylaxis and treatment.
7. Pathogenesis and clinical findings in respiratory syncytial infections. Laboratory diagnosis of diseases, specific prophylaxis and treatment.
8. Coronaviruses, classification, structure and properties.
9. Coronaviral infections in humans: pathogenesis, clinical findings, laboratory diagnosis, prophylaxis and treatment.
10. Structure and properties of SARS-associated coronavirus.
11. Pathogenesis and clinical findings in SARS.
12. Laboratory diagnosis of SARS, prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 175-194.
3. "Laboratory training course in microbiology". L.B. Borisov, 1984, p. 230-239.
4. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 171-175, 177-182, 403-415.

Original work of students:

1. Hemagglutination inhibition test for the identification of influenza virus.

Reagents	Serum dilutions						Control
	1:10	1:20	1:80	1:80	1:160	1:320	
	1	2	3	4	5	6	7
Saline	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Anti-influenza serum (H_2N_2), 1/5	0,2	0,2	0,2	0,2	0,2	0,2	
Anti-influenza serum (H_3N_2), 1/5	0,2	0,2	0,2	0,2	0,2	0,2	
Allantoic fluid (4 HAU)	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Incubation	at 37°C for 1 h						
Erythrocyte suspension	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h						
Results:							
Anti-influenza serum (H_2N_2), 1/5							
Anti-influenza serum (H_3N_2), 1/5							
Conclusion:							

2. Microscopy of the cell culture preparation with measles virus symplasts (demonstration).

3. Microscopy of the cell culture preparation with adenoviral inclusions (demonstration).

Practical classes №15

The topic: ***Picornaviruses (enteroviruses, polioviruses, coxsackieviruses, echoviruses). Reoviruses and rotaviruses. Adenoviruses***

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get acquaintance with laboratory diagnosis of poliomyelitis, enteroviral infections, rotaviral infection; infections, caused by adenoviruses
3. To know preparations for diagnostics, specific prophylaxis and treatment of above viral diseases.

The questions to the topic:

1. Picornaviruses: classification and general characteristics.

2. Polioviruses. Pathogenesis and clinical findings in poliomyelitis. Laboratory diagnosis and specific prophylaxis of disease.

3. Coxsackieviruses of A and B groups. Clinical forms of coxsackievirus infection. Laboratory diagnosis and prophylaxis of coxsackievirus infection.

4. Echoviruses and other pathogenic enteroviruses. Clinical findings in echovirus infection. Laboratory diagnosis and prophylaxis of echovirus infections.

5. Reoviruses and rotaviruses. Classification and general characteristics.

6. Laboratory diagnosis and prophylaxis of rotaviral infections.

7. Adenoviruses, classification, structure and properties, replication cycle.

8. Pathogenesis and clinical findings in adenoviral infections.

9. Laboratory diagnosis of adenoviral diseases, specific prophylaxis and treatment.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 195-209.
3. "Laboratory training course in microbiology". L.B. Borisov, 1984, p. 246-248.
4. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 184-188.

Original work of students:

1. Serologic diagnosis of coxsackievirus infection by hemagglutination inhibition test.

Reagents	Serum dilutions						Control
	1:10	1:20	1:80	1:80	1:160	1:320	
	1	2	3	4	5	6	7
Saline	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Paticnt's serum I, 1/5	0,2	0,2	0,2	0,2	0,2	0,2	
Patient's serum II, 1/5	0,2	0,2	0,2	0,2	0,2	0,2	
Coxsackievirus diagnosticum (4 HAU)	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Incubation	at 37°C for 1 h						
Erythrocyte suspension	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Incubation	at 37°C for 1 h						
Results:							
Serum I							
Serum II							
Conclusion:							

2. Indication and identification of polioviruses by "color" neutralization reaction of viral cytopathic effect.

Practical classes №16

The topic: ***Retroviruses and human immunodeficiency virus (HIV). Hepatotropic viruses (causative agents of hepatites A, B, C, D, E)***

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get acquaintance with laboratory diagnosis of HIV-infection.
3. To get acquaintance with laboratory diagnosis of viral hepatites.
4. To get skills of HIV laboratory diagnosis by ELISA test.

The questions to the topic:

1. Retroviruses, their classification. Structure of HIV. Virion resistance
2. HIV replication cycle. Pathogenesis of HIV infection.
3. Epidemiology and clinical findings in HIV infection. AIDS progressing.
4. Laboratory diagnosis, specific treatment and prophylaxis of HIV infection.
5. Hepatitis A virus. Pathogenesis and clinical findings in hepatitis A. Laboratory diagnosis of disease, specific prophylaxis and treatment.
6. Hepatitis B virus. Classification, structure and properties, HBV replication cycle. Pathogenesis and clinical findings in hepatitis B. Laboratory diagnosis, specific prophylaxis and treatment.
7. Hepatitis D virus. Classification, structure and properties. Clinical findings in delta-infection. Laboratory diagnosis of hepatitis D.
8. Hepatitis C virus. Classification, structure and properties. Clinical findings in hepatitis C. Prognosis of HCV infection. Laboratory diagnosis, prophylaxis and treatment.
9. Hepatitis E virus. Structure and properties. Clinical findings in hepatitis E. Laboratory diagnosis of HEV infection.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 210-231.
3. "Practical work in medical microbiology". A. Pavlovich, 1993, p. 177, 182-183, 189-192.

Original work of students:

1. Demonstration of Western blotting analysis for serologic diagnosis of HIV infection.
2. Evaluation of ELISA test for serologic diagnosis of hepatitis B.

Practical classes №17

The topic: ***Herpesviruses. Rabdoviruses. Rubella virus. Prions and prion diseases***

The main aim and the tasks of the work:

1. To learn the theoretical knowledge of the topic.
2. To get acquaintance with laboratory diagnosis of herpes viral infection, rabies and rubella.
3. To get skills of rabies diagnosis by microscopy.
4. To get skills of PCR practical application for diagnosis of viral infections.
4. To get acquaintance with prion diseases.

The questions to the topic:

1. Herpesviruses. Classification and general characteristics.

2. Herpes simplex viruses of 1 and 2 type. Pathogenesis and clinical findings in herpetic infection. Laboratory diagnosis, treatment and prophylaxis of disease.

3. Varicella-zoster herpesvirus infections. Pathogenesis and clinical findings in varicella and zoster. Laboratory diagnosis, prophylaxis and treatment of varicella and shingles.

4. Cytomegalovirus infection. Pathogenesis and clinical findings in CMV infection. Laboratory diagnosis, prophylaxis and treatment.

5. Epstein-Barr virus infection. Clinical findings in EBV infection. Laboratory diagnosis, prophylaxis and treatment. Burkitt's lymphoma and nasopharyngeal carcinoma.

6. Herpesvirus infection of HV types 6, 7 and 8. General characteristics. Laboratory diagnosis.

7. Rubella virus. Classification, structure and properties.

8. Clinical findings in rubella. Congenital rubella syndrome. Laboratory diagnosis, specific prophylaxis and treatment of rubella.

9. Rabdoviruses, classification and general characteristics. Rabies virus. Structure and properties.

10. Pathogenesis and clinical findings in rabies. Laboratory diagnosis, specific passive and active prophylaxis of rabies.

11. Classification and general characteristics of prions and prion diseases. Pathogenesis of prion infections: the role of PrPc and PrPsc proteins.

12. Diagnosis of human prion diseases: Gerstmann-Straussler-Scheinker syndrome, Creutzfeld-Jacob disease, fatal familial insomnia, Kuru disease, Alpers syndrome.

THE LITERATURE:

1. Lecture material.
2. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 232-249.
3. "Laboratory training course in microbiology". L.B. Borisov, 1984.
4. "Practical work in medical microbiology". A. Pavlovich, 1993.

Original work of students:

1. Demonstration microscopy of Babes-Negri bodies in hyppocampus section in rabies.
2. Cytoplasmic inclusions in epithelial cells of salivary glands in CMV infection.
3. Evaluation of PCR test for diagnosis of cytomegalovirus infection.

Practical classes №18

The topic: ***final classes of section "Microbial genetics. Medical virology"***

The main aim and the tasks of the work:

To summarize essential data of microbial genetics and medical virology, to revise the knowledge of major viral infections and methods of their laboratory diagnosis, prophylaxis and treatment.

The questions to the topic:

1. Organization of bacterial genome. Plasmids and episomes, their structure and function. Transposons, IS-sequences.
2. Recombination: general characteristics and mechanisms. Bacterial transformation.
3. Bacterial transduction and conjugation: genetic mechanisms.
4. Methods of molecular genetic analysis: molecular hybridization of nucleic acids. Polymerase chain reaction.
5. Principles of genetic engineering. Applications of recombinant technologies in biology and medicine.
6. Classification and structure of viruses. Viral genomic organization.
7. Virus replication cycle. Outcomes of viral infections.
8. Laboratory diagnosis of viral infections. Different types of cell cultures. Indication and identification of viruses in cell cultures.

9. Influenza viruses, classification, structure and properties, replication cycle. Pathogenesis and clinical findings in influenza.
10. Laboratory diagnosis of influenza. Specific prophylaxis and treatment of the disease.
11. Paramyxoviruses. Classification, general characteristics, replication cycle. Pathogenesis and clinical findings in parainfluenza. Laboratory diagnosis of disease, specific prophylaxis and treatment.
12. Measles virus, classification, structure and properties. Pathogenesis and clinical findings in measles. Laboratory diagnosis of disease, specific prophylaxis and treatment.
13. Mumps virus, classification, structure and properties. Pathogenesis and clinical findings in mumps. Laboratory diagnosis of disease, specific prophylaxis and treatment.
14. Respiratory syncytial virus, classification, structure and properties. Pathogenesis and clinical findings in respiratory syncytial infections. Laboratory diagnosis of diseases, specific prophylaxis and treatment.
15. Human coronaviruses, classification, structure and properties. SARS-associated virus. Pathogenesis and clinical findings in severe acute respiratory syndrome. Laboratory diagnosis, prophylaxis and treatment.
16. Adenoviruses, classification, structure and properties. Pathogenesis and clinical findings in adenoviral infections. Laboratory diagnosis of adenoviral diseases, specific prophylaxis and treatment.
17. Picornaviruses: classification and general characteristics. Polioviruses. Pathogenesis and clinical findings in poliomyelitis. Laboratory diagnosis and specific prophylaxis of disease.
18. Coxsackieviruses of A and B groups. Classification and general characteristics. Clinical forms of coxsackieviral infection. Laboratory diagnosis and prophylaxis of coxsackieviral infection
19. Reoviruses and rotaviruses. Classification and general characteristics. Laboratory diagnosis and prophylaxis of rotaviral infections.
20. Hepatitis A virus. Pathogenesis and clinical findings in hepatitis A. Laboratory diagnosis of disease, specific prophylaxis and treatment.
21. Hepatitis B virus. Classification, structure and properties, HBV replication cycle. Pathogenesis and clinical findings in hepatitis B. Laboratory diagnosis, specific prophylaxis and treatment.
22. Hepatitis C virus. Classification, structure and properties. Clinical findings in hepatitis C. Prognosis of HCV infection. Laboratory diagnosis, prophylaxis and treatment.
23. Hepatitis E and D viruses. Structure and properties. Clinical findings in hepatites E and D. Laboratory diagnosis of HEV and delta-infection.
24. Retroviruses, their classification. Structure of HIV. Virion resistance. HIV replication cycle. Pathogenesis of HIV infection.
25. Epidemiology and clinical findings in HIV infection. AIDS progression. Laboratory diagnosis, prophylaxis and specific treatment of HIV infection.

26. Herpesviruses. Classification and general characteristics. Herpes simplex viruses of 1 and 2 type. Pathogenesis and clinical findings in herpetic infection. Laboratory diagnosis, treatment and prophylaxis of disease.
27. Varicella-zoster herpesvirus infections. Pathogenesis and clinical findings in varicella and zoster. Laboratory diagnosis, prophylaxis and treatment of varicella and shingles.
28. Cytomegalovirus infection. Pathogenesis and clinical findings in CMV infection. Laboratory diagnosis, prophylaxis and treatment. Herpesvirus infection of HV types 6, 7 and 8. General characteristics. Laboratory diagnosis.
29. Epstein-Barr virus infection. Clinical findings in EBV infection. Laboratory diagnosis, prophylaxis and treatment. Burkitt's lymphoma and nasopharyngeal carcinoma.
30. Rubella virus. Classification, structure and properties. Clinical findings in rubella. Congenital rubella syndrome. Laboratory diagnosis, specific prophylaxis and treatment of rubella.
31. Rabdoviruses, classification and general characteristics. Rabies virus. Structure and properties. Pathogenesis and clinical findings in rabies. Laboratory diagnosis, specific passive and active prophylaxis of rabies.
32. Prions and prion diseases. Classification and general characteristics. Pathogenesis of prion diseases. Laboratory diagnosis and prophylaxis of human prion diseases.

THE LITERATURE:

1. Lecture material.
2."General Microbiology & Essential Immunology: Lecture Course". I. I. Generalov, 2005, p. 83-102.
3. "Special Microbiology & Medical Virology: Lecture Course". I. I. Generalov, 2005, p. 162-249.
4. "Laboratory training course in microbiology". L.B. Borisov, 1984.
5. "Practical work in medical microbiology". A. Pavlovich, 1993.

Demonstration material: hemagglutination inhibition test and enzyme-linked immunosorbent assay (ELISA) test for serologic diagnosis of viral infections, anti-rabies gamma-globulin, anti-measles gamma-globulin influenza serum A (H_3N_2), influenza diagnosticum type A (H_3N_2), HBs-vaccine, live poliomyelitis vaccine, Trimovax vaccine.