

General microbiology

1. The relationship between human and microorganisms. Human microbiota and its importance for health. Pathogenetic potential of human microbiota. Dysmicrobia (disruption of the microbiota balance) and its possible consequences.
2. Shape, size, arrangement, and structure of bacterial cell; use in the diagnostics of infectious diseases. The importance of bacterial structures in the pathogenesis, diagnostics, treatment, and prevention of infectious diseases.
3. Growth, reproduction, and metabolism of bacteria and their importance in the pathogenesis, diagnostics, treatment, and prevention of infectious diseases.
4. Bacterial genome and its importance in microbiological diagnostics; genome changes, transfer of genetic information between bacteria, and their importance from the point of view of human medicine.
5. Bacteriophages and their interaction with bacteria. Use of bacteriophages in human medicine.
6. Pathogenicity and virulence, overview of bacterial virulence factors and regulation of their production. Pathogenesis of bacterial infections, adhesion of bacteria, their evasion from immune mechanisms, invasion mechanisms to host cells, and damage to tissues, and organs by bacterial degradation enzymes.
7. Bacterial toxins and their importance in pathogenesis, diagnostics, treatment and prevention of infectious diseases.
8. Lipopolysaccharide and other bacterial endotoxins, their interaction with immune system, their importance in defense against microorganisms and participation in the pathogenesis of infectious diseases.
9. Phenotypic adaptation of bacteria and the problems it causes in diagnostics and treatment of infectious diseases. Sporulation and the importance of bacterial spores in medical microbiology.
10. Basic characteristics of antibacterial drugs and their division according to origin, effect on bacteria, spectrum of activity, way of use, chemical structure, and target site of intervention in bacterial cell.
11. Resistance to antibacterial drugs - natural and acquired resistance, emergence and spread of acquired resistance mechanisms, mechanisms of resistance; important types of resistance of bacteria causing nosocomial and community infections.
12. Beta-lactam antibiotics and beta-lactamase inhibitors.
13. Aminoglycosides. Macrolides, ketolides, and lincosamides.
14. Tetracyclines, glycyclines, and chloramphenicols.
15. Quinolones and fluoroquinolones. Rifampicin. Nitrofurans. Nitroimidazoles (metronidazole).
16. Antibiotics that inhibit the synthesis of folic acid (sulfonamides, trimethoprim, co-trimoxazole). Fidaxomicin, fosfomicin. Polymyxins (colistin).
17. Reserve antibacterial drugs for gram-positive bacteria – glycopeptides (vancomycin, teicoplanin, and others), lipopeptides (daptomycin), and oxazolidinones (linezolid, and tedizolid). Antibacterial drugs for local use (neomycin, bacitracin, mupirocin, fusidic acid, and others).

18. Antituberculotics.
19. Decontamination, disinfection, and sterilisation. Antiseptics and their use in the treatment and prevention of infectious diseases.
20. Classification, structure and replication of viruses, use in diagnostics, treatment, and prevention of viral infections. Genetics of viruses, mutations of viruses, and their medical importance.
21. Pathogenesis of viral infections, interaction of viruses with the host at the cell and organism level.
22. Antiviral drugs.
23. Classification, structure, and reproduction of human parasites, use in diagnostics and therapy. Pathogenesis of parasitic infections. Epidemiology and prevention of parasitosis.
24. Antiparasitic drugs.
25. Basic properties, morphology and classification of medically important micromycetes, use in diagnostics, treatment, and prevention of mycoses. Importance of micromycetes in human medicine. Pathogenesis of fungal infections.
26. Antimycotics.
27. Pre-analytical phase of microbiological examination - principles of collection, transport, and processing of material for microbiological examination. Direct and indirect microbiological diagnostics, algorithm for microbiological diagnostics of infectious diseases (basic information).
28. Microscopic diagnostics of infectious diseases - methods, interpretation of results and importance for diagnostics, and empirical therapy of infectious diseases.
29. Cultivation diagnostics of infectious diseases – brief overview of the most used cultivation media, cultivation conditions, identification of cultivated microorganisms and interpretation of cultivation results. Importance for treatment, and prevention of infectious diseases.
30. Rapid and automated microbiological diagnostics. The use of molecular biology methods in the diagnostics, treatment, and prevention of infectious diseases. Antigens of microorganisms and their importance in the pathogenesis, diagnostics, and prevention of infectious diseases and their consequences.
31. Determining the susceptibility of bacteria and microscopic fungi to anti-infective drugs - qualitative tests (disc diffusion method), quantitative tests (detection of MIC, MBC), detection of resistance mechanisms. Use of the results in the targeted and empirical therapy of infectious diseases. Determining the levels of antimicrobial drugs in the serum - reason and importance for the patient.
32. Indirect diagnostics of infectious diseases - detection of specific antibodies and specific cellular immunity - methods and basic principles of interpretation of results.

Special microbiology

Scheme for each question: Causative agents of infectious diseases - basic characteristics (morphology, physiology), pathogenicity and important virulence factors, natural habitat of microorganism, epidemiology, pathogenesis, diseases and groups of hosts under the risk of infection, microbiological diagnostics, possibilities of therapy and prevention

1. Streptococci – basic characteristics, viridans streptococci, and *Streptococcus pneumoniae*. Enterococci.
2. Beta-haemolytic streptococci. Immunopathological sequelae of streptococcal infections.
3. Staphylococci – basic characteristics, coagulase-negative staphylococci.
4. *Staphylococcus aureus*.
5. *Bacillus*.
6. *Listeria* and *Erysipelothrix*.
7. *Mycobacterium tuberculosis* complex.
8. Nontuberculous mycobacteria and *Mycobacterium leprae*
9. *Nocardia* and other weakly acid-fast bacteria. Actinomyces.
10. *Corynebacterium* and *Arcanobacterium*. *Cutibacterium*.
11. *Neisseria*.
12. Enterobacterales – basic characteristics. *Klebsiella*, *Enterobacter*, *Proteus*, and other genera from the Enterobacterales (except the genera *Escherichia*, *Salmonella*, *Shigella* and *Yersinia*).
13. *Escherichia*.
14. *Salmonella*.
15. *Shigella*.
16. *Yersinia*.
17. *Vibrio* and *Aeromonas*.
18. *Haemophilus* and related bacteria. Bacteria of the HACEK group.
19. *Pseudomonas aeruginosa* and other gram-negative non-fermenting bacteria.
20. *Campylobacter* and *Helicobacter*.
21. *Bordetella*.
22. *Legionella*.
23. *Brucella* and *Francisella*.
24. Bacteria transmitted by animal bites: *Pasteurella*, *Capnocytophaga*, *Streptobacillus*, *Spirillum*.
25. Anaerobic bacteria - basic characteristics. Non-sporulating anaerobic bacteria.
26. Neurotoxic clostridia - *Clostridium tetani*, clostridia producing botulinum toxin.

27. Clostridium perfringens and other myonecrotic clostridia. Clostridioides difficile.
28. Treponema.
29. Borrelia and Leptospira.
30. Mycoplasma and Ureaplasma.
31. Rickettsia, Orientia, Ehrlichia, and Anaplasma.
32. Coxiella, Bartonella.
33. Chlamydia.
34. Papillomaviruses and polyomaviruses.
35. Adenoviruses, parvoviruses, and poxviruses.
36. Herpes simplex virus, varicella zoster virus.
37. Epstein-Barr virus and human herpes virus 8
38. Cytomegalovirus and human herpes virus 6 and 7
39. Picornaviruses – enteroviruses, polioviruses, coxsackieviruses, echoviruses. Togaviruses - rubella virus.
40. Rhinoviruses and coronaviruses. Causative agents of diarrhea of viral etiology (rotaviruses, noroviruses and others).
41. Paramyxoviruses – mumps virus and morbillivirus.
42. Orthomyxoviruses – influenza viruses. Paramyxoviruses - respiratory syncytial virus, parainfluenza viruses.
43. Hemorrhagic fever viruses not transmitted by arthropods (from the families Bunyaviridae, Arenaviridae, and Filoviridae). Rabies virus.
44. Arboviruses (from the family Togaviridae, Flaviviridae, Bunyaviridae, and Reoviridae).
45. Retroviruses.
46. Hepatitis viruses (A-E).
47. Prions and prion diseases. Slow viral degenerative CNS infections (caused by morbillivirus, JC virus, and HIV).
48. Intestinal and urogenital protozoa.
49. Blood protozoa (Plasmodium, Trypanosoma, Babesia).
50. Tissue protozoa (Toxoplasma, free-living amoebas, Leishmania).
51. Fluke worms (Trematodes).
52. Tapeworms (Cestodes) as the causative agents of intestinal infestations and larval parasitoses.
53. Intestinal nematodes.
54. Tissue nematodes.

55. Filariae.
56. Parasitic arthropods.
57. Causative agents of superficial and skin mycoses.
58. Yeasts and *Pneumocystis jiroveci*.
59. Filamentous fungi causing subcutaneous and deep infections.
60. Dimorphic micromycetes causing endemic mycoses.

Basics of clinical microbiology and antiinfectious immunology

1. Gastrointestinal microbiome, its protective role and role in the pathogenesis of human diseases.
2. Oral microbiome and its importance in the development of dental caries, periodontal diseases and systemic diseases.
3. Skin and urinary microbiome. Reproductive tract microbiome. Their protective role and role in the pathogenesis of human diseases.
4. Respiratory microbiome. Microbiome of the conjunctiva. Their protective role and role in the pathogenesis of human diseases.
5. Respiratory tract infections - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
6. Infections of the heart and other infections of the cardiovascular system - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
7. Sepsis - causative agents, pathogenesis, groups of people at risk. Principles of correct collection and transporting of blood for hemocultivation, its processing and interpretation of the results. Basics of therapy and prevention.
8. Infections of the central nervous system, infections of the eye and its supporting structures - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
9. Infections of the skin and skin adnexa - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
10. Infections of wounds, soft tissues, bones and joints - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
11. Infections caused by anaerobic bacteria, anaerobic traumatoses, infections of the abdominal cavity - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
12. Infections threatening the development of the fetus and newborn - causative agents, pathogenesis, microbiological diagnostics, basics of therapy and possibilities of prevention. Screening for infectious diseases during pregnancy. Specifics of infectious diseases during pregnancy and after delivery.
13. Genital system infections and sexually transmitted diseases - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
14. Urinary tract infections - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
15. Infections of the gastrointestinal tract (esophagus, stomach and intestines) - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
16. Infections of the liver and hepatobiliary system - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
17. Nosocomial infections - causative agents, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
18. Infections of immunosuppressed patients - causative agents, pathogenesis, microbiological diagnostics, basics of therapy and prevention.
19. Biofilm and its physiological significance. Infections related to biofilm and foreign body - causative agents, pathogenesis, groups of people at risk, microbiological diagnostics, basics of therapy and prevention.
20. Infections caused by a biological weapon. Microbiological diagnostics of biological agents during the threat of a biological weapon.

21. Microorganisms causing oncogenic diseases. Possibilities of diagnostics and prevention.
22. Principles of rational antimicrobial therapy. Combination of antibiotics. Side effects of antibiotics.
23. Antibacterial immunity in defense against infection and in the pathogenesis of infectious diseases. Possibilities of influencing antibacterial immunity.
24. Antiviral immunity in defense against infection and in the pathogenesis of infectious diseases. Possibilities of influencing antiviral immunity.
25. Antimycotic and antiparasitic immunity in the defense against infection and in the pathogenesis of infectious diseases. Possibilities of influencing antimycotic and antiparasitic immunity.
26. Active immunization, regular compulsory vaccination of children and adults in Slovakia. Passive immunization.
27. Immunomodulators of microbial origin (commercial preparations and autovaccines).
28. Microbiological diagnostics of infectious diseases of bacterial origin, interpretation of the results and use in therapy and prevention.
29. Microbiological diagnostics of infectious diseases of viral origin, interpretation of the results and use in therapy and prevention.
30. Microbiological diagnostics of infectious diseases of mycotic origin, interpretation of results and use in therapy and prevention.
31. Microbiological diagnostics of human parasites, interpretation of results and use in therapy and prevention.