MEDICAL MICROBIOLOGY

Final exam questions for medical students

2019/2020

I. General microbiology and general bacteriology

1. Medical microbiology: significance, sub-fields and brief history
2. Comparison of pro- and eukaryotic cells
3. Essential structures of the bacterial cells
4. Structure of the bacterial cell wall
5. Accessory/non-essential cell components of bacterial cells
6. Classification (taxonomy) of bacteria
7. Principles of bacterial metabolism
8. Bacterial genetics: modification, mutation, reversion
9. Bacterial genetics: mechanisms of the transfer of genetic material
10. Principles and practice of sterilization, LAL test
11. Principles and practice of disinfection
12. Selective toxicity, chemotherapeutic index, principles of antibacterial chemotherapy
13. Chemoprophylaxis: its importance and examples
14. Antibiotics in combinations
15. Risks and side effects of antibacterial chemotherapy
16. Antibiotics altering the peptidoglycan synthesis: Penicillin, Cephalosporin
17. Antibiotics altering the peptidoglycan synthesis: monobactam, carbapenem, bacitracin
18. Antibiotics altering the protein synthesis: aminoglycosides, tetracycline
19. Antibiotics altering the protein synthesis: chloramphenicol, macrolides, lincosamides
20. Antibacterial drugs acting at the level of nucleic acid synthesis
21. Glycopeptides and antimicrobial drugs altering the membrane functions. Antibiotics altering the membrane functions
22. Antituberculotic drugs
23. Resistance mechanism against antibiotics (examples)
24. Pathogenicity, virulence. Obligate, facultative, and opportunistic pathogens
25. Infection: definition, source, portal of entry, transmission routes, and possible outcome
26. Pathomechanism of infection: adhesion, penetration, invasion, dissemination; bacteriaemia and toxaemia
27. Endotoxin: characterisation, mode of action
28. Exotoxins: characterisation, types. Bacterial super-antigens and associated syndromes
29. Non-toxic virulence factors of bacteria
30. Role of the host organism in the pathogenesis

31. Active immunization. Obligatory vaccines
32. Active immunization: non obligatory vaccines
33. Passive immunization, and its risks and side-effects. Chemoprophylaxis
34. Pathomechanism of infection: molecular mimicry and masking; antigen-shift; immunosuppression. Immunomodulant and immunosuppressive effects of microbes (examples)
35. Nosocomial (iatrogenic) infections and their most important causative agents
36. Sepsis (definition, pathomechanism, microbiological diagnosis)
37. Normal microbial flora of human and its significance

II. Systematic bacteriology

(Note: morphology, culture, antigen structures, virulence factors, pathogenesis of caused disease(s), diagnosis, therapy, prevention.)

1. *Staphylococcus aureus*
2. Coagulase negative staphylococci
3. *Streptococcus pneumoniae*, oral streptococci and cariogenezis. Anaerobic cocci
4. *Streptococcus pyogenes*
5. *Streptococcus agalactiae, Enterococcus* genus
6. Anaerobic Gram-negative rods (*Bacteroides, Fusobacterium, Prevotella, Porphyromonas* streptococci)
7. *Neisseria meningitidis.* Apathogenic *Neisseria* species
8. *Neisseria gonorrhoeae. Moraxella* genus.
9. *Salmonella* genus. Salmonellae causing gastroenteritis
10. *Salmonella typhi* and *Salmonlla paratyphi A, B, C*
11. *Escherichia coli*
12. *Shigella* genus
13. *Klebsiella*, *Enterobacter*, *Proteus*, and *Serratia* genus
14. *Yersinia* genus (*Y. pestis* and yersiniosis)
15. *Vibrio cholera*
16. *Vibrio parahaemolyticus, V. vulnificus. Aeromonas and Plesiomonas genus*
17. *Campylobacter genus and Helicobacter pylori*
18. *Haemophilus* genus
19. *Pseudomonas* group and *Acinetobacter, Burkholderia, Stenotrophomonas* genus
20. *Bordetella* genus
21. *Legionella* pneumophila
22. *Brucella* genus
23. *Pasteurella multocida, Francisella* tularensis, *Bartonella* species
24. *Bacillus anthracis* and other species of the *Bacillus* genus

25. Gas-gangrene clostridia
26. *Clostridium tetani*
27. *Clostridium botulinum* and C. *difficile*
28. *Listeria monocytogenes*. *Erysipelothrix rhusiopathiae, Lactobacillus* and *Bifidobacterium* genus. Pre- and probiotics
29. *Treponema* genus
30. *Borrelia* genus
31. *Leptospira* genus
32. *Corynebacterium diphtheriae*, diphtheroids and the *Propionibacterium* genus
33. *Actinomyces* and *Nocardia* genus, atypical and apathogenic mycobacteria
34. Causative agents of human tuberculosis*, Mycobacterium leprae*.
35. *Rickettsia*, *Orientia*, *Coxiella*,
36. *Chlamydia trachomatis* and respiratory tract infections caused by Chlamydia
37. *Mycoplasma* and *Ureaplasma* genus

III. General and systematic virology

1) Principles of virus structures. Sub-viral agents: viroid, prion
2) Propagation of viruses. Molecular bases of the biosynthesis of viruses: productive infection
3) Latent and persistent viral infections (examples)
4) Congenital viral infections (examples)
5) Malignant transformation. Viral oncogenesis, oncogenic viruses (examples)
6) Host defence mechanism against viruses
7) Pathogenicity of viruses, pathogenesis of viral diseases
8) Chemoprophylaxis and treatment of viral diseases
9) Obligatory vaccines against viruses
10) Non-obligatory vaccines against viruses
11) Adenoviruses
12) Herpesviruses: HSV-1 and -2
13) Herpesviruses: VZV
14) Herpesviruses: EBV
15) Herpesviruses: CMV
16) Herpesviruses: HHV6, 7, 8
17) Parvoviruses
18) Papilloma and Polyomaviruses (BK, JC)
19) Poxviruses
20) Arena- (LCM-, Lassa-, Machupovirus)
21) Bunyaviruses (Hanta-, Crimean-Congo haemorrhagic fever virus)
22) Corona- and Filoviruses
23) Flavivirus (yellow fever, Dengue)
24) Flavivirus: Tick-born ecephalitis-, West Nile- and Zikavirus
25) Rota-, Calici- and Astroviruses
26) Orthomyxoviruses
27) Paramyxoviruses: Mumps-, Morbillivirus
28) Paramyxoviruses: RSV, Parainfluenzavirus

29) Picornaviruses: Poliovirus)
30) Picornaviruses: Rhino-, Coxsackie-, echo- and enteroviruses
31) Rhabdoviruses
32) Retroviruses and AIDS
33) Togaviruses (Alpha- and Rubi virus)
34) Hepatitis viruses: A, E
35) Hepatitis viruses: B, C, D, G
36) Conventional and non-conventional slow virus infections
37) Serological reactions in the diagnosis of viral diseases

IV. General and systematic mycology and parasitology

1. Structure, metabolism, life cycle and classification of medically important fungi
2. Classification, pathomechanism and risk factors of mycoses
3. Cultivation of fungi. Microbiological diagnosis of fungal infections
4. Treatment of fungal infections
5. Mycoses of the skin and its adnexes: dermatophytoses
6. Superficial and sub-cutaneous mycoses
7. Coccidioides *immitis*. *Histoplasma capsulatum*
8. *Blastomyces dermatitidis*, *Paracoccidiodes brasiliensis*
9. *Cryptococcus neoformans*, *Pneumocystis jirovecii* (carinii)
10. *Zygo*- (phyco-) mycoses. *Aspergillus* species and *Penicillum* genus
11. *Candida* genus
12. General characterisation and taxonomy of protozoa
13. *Entamoeba histolytica* and *Entamoeba coli*
14. *Acanthamoeba* and *Naegleria* genus
15. *Giardia lamblia*, *Balantidium coli*
16. *Cryptosporodium* spp. and *Blastocystis hominis*
17. *Trichomonas vaginalis*
18. Plasmodia
19. *Trypanosoma brucei*
20. *Trypanosoma cruzi*
21. Leishmaniae
22. *Toxoplasma gondii*
23. General characterisation and taxonomy of helminths
24. *Taenia saginata*
25. *Taenia solium*
26. *Diphyllobothrium latum* and *Hymenolepis nana*
27. *Echinococcus* species
28. *Fasciola hepatica*
29. *Paragonimus westermani*
30. Schistosomes
31. *Ancylostoma duodenale* and *Necator americanus*

32. *Toxocara canis*, *T. cati*
33. *Trichinella spiralis*
34. *Enterobius vermicularis*
35. *Ascaris lumbricoides*. *Trichuris trichuria*
36. *Strongyloides stercoralis, Dirofilaria repens*
37. Worms causing filariasis

V. Summary: Clinical microbiology and microbiological diagnostics

1. Bacteria causing skin and wound infections (list) and their diagnosis
2. Bacteria causing abdominal infections (peritonitis, cholecystitis, cholangitis - (list) and their diagnosis
3. Bacteria and viruses causing ophthalmic (eye) infections (list) and their diagnosis
4. Bacteria causing air-borne upper respiratory tract infections (list) and their diagnostics
5. Normal flora of the oral cavity. Microbes causing infections of the oral cavity (list)
6. Normal flora of the gastrointestinal tract and its significance
7. Pathogens of the enterally (faecal-oral route) spreading bacterial infections (list) and their diagnosis
8. The most important microbial pathogens of the urinary tract (list)
9. Causative agents of arthropode borne bacterial infections (list)
10. Bacterial pathogens of food-poisoning and toxico-infections (list)
11. Zoonotic infections (list) and their prevention
12. The most important bacteria causing meningitis, and encephalitis (list) their diagnosis, and principles of treatment
13. Bacteria causing lower respiratory tract infections (list) and their diagnosis
14. Bacterial exotoxins and the related diseases. Prevention and therapy
15. Microbiological diagnosis of bacteriaemia, endocarditis, and sepsis
16. Description and diagnosis of infections caused by anaerobic bacteria
17. Enterally acquired parasitic infections (list) and their diagnosis
18. Causative agents of arthropode borne parasitic infections (list) and their diagnosis
19. Pathogens of the air-borne viral infections (list)
20. Pathogens of the enterally acquired viral infections (list)
21. Causative agents of arthropode borne viral infections (list)
22. Pathogens of viral and fungal meningitis and encephalitis (list)
23. Pathogens of fungal and parasitic lung infections (list)
24. Microbes causing pre- and perinatal infections (list) in the fetus/new-born baby
25. Child-hood infections characterized by exanthemas (rashes)
26. Normal flora of the genital tract. Pathogens of sexually transmitted diseases (list)
27. Screening and verification of HIV-infections. Microbes causing opportunistic infections related to AIDS (list)
28. Pathogens of hepatitis and their transmission, as well as microbiological diagnosis

29. Infectious specimens: basic rules of sample collection, transport, and laboratory procedures
30. Measurement and alteration of virulence. Significance of attenuation. Bioterrorism and biological weapons
31. The use of laboratory animals in the medical microbiology.
32. Sero-typing and phage-typing
33. Molecular examination methods used in microbiology
34. Causative agents causing atypical pneumonia and their diagnosis
35. Causative agents of diarrhoea and diagnosis
36. Principles of the evaluation of serological tests. Pair of sera test, meaning of titre
37. Protozoa and helminths causing ophthalmic (eye) infections (list) and their diagnosis