

1. What does sterilisation mean?
  - a. Killing procedure of any kind of germs.
2. What does disinfection mean?
  - a. Procedure where the number of the germs are reduced to a safety level.
3. Which parameters can influence the effectivity of the sterilisation?
  - a. The number of the germs, the resistance of the germs, the concentration of the disinfectants, the presence of the organic materials, the initial time, the presence of the biofilm.
4. Parameters of the hot-air sterilisation cupboard protocol?
  - a. 180°C; 1 hour, 160°C; 2 hours, 140°C; 3 hours.
5. Parameters of the autoclaving?
  - a. + 1 atm overpressure, 121°C, 20-30 minutes or 134°C, +2 atm overpressure 10 minutes.
6. Chemical agents used for gas sterilisation?
  - a. Etilene oxide, formaldehyde, beta-propiolacton
7. The theoretical background of plasma sterilisation?
  - a. Hydrogen-peroxide in high electric field will form plasma stage. The produced free radicals will kill the microbes. At the end of the procedure will be produced water, oxygen and other nontoxic products.
8. Biological method used for checking the effectivity of the sterilisation.
  - a. By *Bacillus/Geobacillus stearothermophilus* spores. If the procedure was performed in correct way, the spores cannot be cultivated.
9. Detection of the presence of pyrogenic material in drugs?
  - a. LAL test; The blood of the horseshoe crab will coagulate in the presence of the LPS
10. What are the disinfectants?
  - a. Chemical agents used on inanimate/non-living surfaces.
11. What are the antiseptic agents?
  - a. Chemical agents used disinfection on animate (tissue, skin, mucous membrane) surfaces.
12. What does serological reaction mean?
  - a. Reaction based on the antigen-antibody reaction performed in vitro.
13. What does agglutination mean?
  - a. Serological reaction where the antigen is cell mediated.
14. What are the bacterial cell surface antigens?
  - a. O: cell wall, H: flagella, K: capsule
15. What does antibody titre mean?

- a. The highest dilution fold or the lowest antibody concentration where we can see in vitro antigen-antibody reaction.
16. What does precipitation mean?
- a. Serological reaction where the antigen is soluble (enzyme, toxin or virus particle).
17. What does iatrogenic infection mean?
- a. Infection caused by medical staff during the investigation or treatment.
18. What does nosocomial infection mean?
- a. Infection occurred in hospital after 48 hours of the hospitalisation.
19. What are the contents of the vaccines?
- a. Live attenuated microbe; killed microbe, toxoid, antigens of the microbe.
20. What does native examination of the microbe mean in microbiology?
- a. The microbe is examined without killing procedure.
21. What kind of information can we get by light microscopically examination? (3 example)
- a. The size of the microbe, the shape of the microbe, the motility, the staining can be examined.
22. The solutions of the Gram-stain?
- a. Sodium oxalate, cristal violet, Iodine solution, 96% of ethanol, fuchsin or safranin.
23. What kind of devices can be used for anaerobic cultivation?
- a. Anaerostate, Gas-pack jar, high agar, anaerobic chamber.
24. Definitions: bacteriostatic, bactericide
- a. bacteriostatic: inhibits bacterial growth
  - b. bactericide: kills bacteria
25. Definition: selective toxicity
- a. the antibiotic has an effect only on the bacteria, but not on the human host
26. Chemotherapeutic index?
- a. dosis tolerata maxima (DTM)/dosis curativa minima (DCM)
27. Cell wall synthesis inhibitor antibiotics?
- a. Penicillin, Cephalosporin, Carbapenem, Glycopeptide.
28. Glycopeptide antibiotics
- a. vancomycin, teicoplanin
29. Membrane function alternating antibiotics are:
- a. Polymyxines
30. What are the protein synthesis inhibitor antibiotics? (3 example)

- a. Aminoglycosides, Tetracycline, Macrolide, Chloramphenicol, Linezolid
31. Nucleic acid synthesis inhibitors are: (2 example)
- a. Quinolones, rifampicin, sulphonamide, trimethoprim.
32. Three possible ways of horizontal gene transfer
- a. conjugation (plasmid)
  - b. transduction (bacteriophage)
  - c. transformation (uptake of naked DNA from the environment)
33. Antibiotic resistance mechanism are:
- a. Enzymatic degradation or modification of the antibiotics, efflux pump, modifying of the antibiotic binding site
34. What does MRSA mean?
- a. Methicillin-resistant *Staphylococcus aureus*
35. What does ESBL mean?
- a. Extended spectrum of beta lactamase enzyme.
36. What does MIC mean?
- a. Minimal bacteriostatic concentration of an antibiotic measured in ug/ml.
37. What does MBC mean?
- a. Minimal bactericidal concentration of an antibiotic measured in ug/ml.
38. Definitions: MBL, MACI, PACI
- a. MBL: metallo-beta-lactamase (=carbapenemase)
  - b. MACI: multi-resistant *Acinetobacter*
  - c. PACI: pan-resistant *Acinetobacter*
39. Which 3 vaccines contain capsular polysaccharide?
- a. Hib (against *Haemophilus influenzae* type b)
  - b. Prevenar / Pneumovax (against 13 / 23 serotypes of *Streptococcus pneumoniae*)
  - c. meningococcus vaccines (against serotypes ACWY) – but not B!
40. What kind of specimen can be sent to the microbiological diagnostic laboratory in the case of typical pneumonia?
- a. Sputum and haemoculture
41. What kind of specimen can be sent to the microbiology diagnostic laboratory in the case of atypical pneumonia?
- a. Blood, urine, broncho-alveolar lavage.
42. What kind of bacterial infection can be treated by antitoxin? (2 example)
- a. Infections caused by bacterial exotoxins: tetanus, botulism, diphtheria
43. Which bacteria can be differentiated with the catalase test?

- a. Staphylococci (+) and Streptococci (-)
44. Which bacteria can be differentiated with the coagulase test?
- a. *Staphylococcus aureus* (+) and the other staphylococcus species (-, so called „coagulase-negative staphylococci“)
45. Microscopic morphology of Staphylococci
- a. Gram-positive cocci, arranged in grape-like structures
46. Colony morphology of *Staphylococcus aureus* on blood agar plate
- a. average size, round colonies with butter consistency, golden pigment production and beta-haemolysis
47. What are the non-toxic virulence factors of *Staphylococcus aureus*? (3 example)
- a. Protein A, endocoagulase (clumping factor), exocoagulase, adhesins, teichoic acid, hyaluronidase, protease, lipase, DN-ase.
48. What are the toxic virulence factors of *Staphylococcus aureus*?
- a. Leucocidin, toxic shock syndrome toxin, exfoliative toxin, enterotoxin, haemolysin
49. Disease caused by *Staphylococcus aureus*?
- a. Folliculitis, furuncle, carbuncle, impetigo, pneumonia, osteomyelitis, food poisoning.
50. Diseases caused by *Staphylococcus aureus* exotoxins? (2 example)
- a. Food poisoning, scalded skin syndrome, toxic shock syndrome
51. List at least 2 coagulase-negative staphylococcus species (from the list provided below)!
- a. *S. epidermidis*, *S. saprophyticus*, *S. haemolyticus*, *S. lugdunensis*
52. Diseases caused by coagulase negative staphylococci?
- a. Nosocomial infections, biofilm production on the surface of plastic devices.
53. Which bacterium can cause „Honeymoon cystitis“?
- a. *Staphylococcus saprophyticus*
54. Colony morphology of *Streptococcus pyogenes* on blood agar plate
- a. small, pin-point colonies, surrounded by large, strong beta-haemolytic zone
55. Which streptococci show beta-haemolysis?
- a. *Streptococcus pyogenes*, *Streptococcus agalactiae*
56. Which streptococci show alpha-haemolysis?
- a. *Streptococcus pneumoniae* and viridans streptococci (e.g. *S. mutans*, *S. mitis*, *S. salivarius*)
57. Which species is the *Lancefield group A* streptococcus?

- a. *Streptococcus pyogenes*
58. Which species is the *Lancefield group B* streptococcus?
- a. *Streptococcus agalactiae*
59. What is the causative agent of scarlet fever?
- a. *Streptococcus pyogenes*?
60. Which bacterial virulence factor is the causative agent of scarlet fever?
- a. Streptococcus pyrogenic exotoxin or erythrogenic toxin
61. What is the capsule of *S. pyogenes* made of?
- a. hyaluronic acid
62. Disease cause by *Streptococcus pyogenes*? (3 examples)
- a. Pharyngitis, tonsillitis, sinusitis, impetigo, erysipelas, necrotising fasciitis, scarlet fever, TSST
63. What kind of post streptococcal infections can be caused by *Streptococcus pyogenes*?
- a. Acute rheumatic fever, glomerulonephritis
64. Which two streptococcus species show 100% penicillin sensitivity still now?
- a. *Streptococcus pyogenes* and *Streptococcus agalactiae*
65. What kind of disease can be caused in new-borns by *Streptococcus agalactiae*?
- a. In new born meningitis, sepsis, pneumonia.
66. Which bacterium is the leading cause of neonatal meningitis?
- a. *Streptococcus agalactiae*
67. Microscopic morphology of *Streptococcus pneumoniae*
- a. Gram-positive diplococci
68. How can be prevented the invasive diseases caused by *Streptococcus pneumoniae*?
- a. By 23 valent polysaccharide capsule vaccine or by 13 valent conjugated vaccine.
69. Which two bacteria can be differentiated based on their optochin sensitivity / resistance?
- a. *S. pneumoniae* (S) and viridans streptococci (R)
70. What kind of disease can be cause by viridans group streptococci?
- a. Dental decay or endocarditis.
71. Which are the 2 most frequent human pathogenic *Enterococcus* species?
- a. *E. faecalis* and *E. faecium*
72. Microscopic morphology of *Neisseria gonorrhoeae*?
- a. Gram-negative, non capsulated diplococci.

73. What kind of culture media can be used to cultivate *Neisseria gonorrhoeae*?
- Chocolate agar or Thayer Martin agar.
74. Microscopic morphology of *Neisseria meningitidis*?
- Gram-negative, capsulated, diplococci.
75. How can *Neisseria meningitidis* spread ?
- By respiratory droplets and will colonize the nasopharynx.
76. What kind of disease can be caused by *Neisseria meningitidis*?
- Sepsis, meningitis, Waterhouse-Friderichsen syndrome.
77. What kind of diseases can be caused by *Neisseria gonorrhoeae*?
- Gonorrhoea, blenorrhoea neonatorum, proctitis, orchitis.
78. What is the causative agent of Waterhouse-Friderichsen syndrome?
- Neisseria meningitidis*
79. What kind of tests can be performed from liquor in case of *Neisseria meningitidis* infection?
- Microscopic examination, Gram-stain, latex agglutination.
80. What can be done prophylactic with the contact person who suffering by *Neisseria meningitidis* infection?
- Chemoprophylaxis by rifampicin or ciprofloxacin.
81. What can cause *Neisseria gonorrhoeae* in newborns?
- Ophthalmoblenorrhoea neonatorum
82. Which serotype of *Haemophilus influenzae* can cause invasive infection?
- The *Haemophilus influenzae* with capsule „b” serotype.
83. How can be prevented the invasive infections caused by *Haemophilus influenzae* strains?
- By Hib vaccine
84. What kind of disease can be caused by *Haemophilus ducreyi*?
- Ulcer molle (chancroid).
85. What is the causative agent of whooping cough?
- Bordetella pertussis*.
86. What are the virulence factors of *Bordetella pertussis*? (2 examples)
- Fimbria, pertactin, pertussis toxin, tracheal cytotoxin, dermatonecrotic toxin.
87. What is the causative agent of tularemia?
- Francisella tularensis*
88. What are the causative agents of human brucellosis? (2 examples)
- Brucella abortus*, *B. melitensis*, *B. suis*, *B. canis*

89. What are the diseases caused by *Bacillus anthracis*? (2 examples)
- Cutaneous anthrax, pulmonary anthrax, gastrointestinal anthrax.
90. What kind of disease can be caused by *Bacillus cereus*?
- Food poisoning (vomiting, diarrhoea), wound infection.
91. What is the causative agent of pseudomembranous colitis?
- Clostridium difficile*
92. What kind of bacteria can cause flaccid paralysis?
- Clostridium botulinum*
93. What kind of bacteria can cause spastic paralysis?
- Clostridium tetani*
94. What is the treatment of Botulism?
- Giving polyvalent antitoxin.
95. What is the treatment of pseudomembranous colitis?
- Vancomycin per os, metronidazole, faecal transplantation.
96. Which bacteria can cause gas gangrene? (2 examples)
- Clostridium perfringens*, *Clostridium histolyticum*, *Clostridium septicum*.
97. What is the causative agent of diphtheria?
- Corynebacterium diphtheriae*.
98. How can the toxin of *Corynebacterium diphtheriae* be detected?
- By Elek's-test, Römer-test (in guinea pig).
99. What is the treatment of diphtheria?
- Passive immunisation, giving antibiotics, artificial ventilation if necessary.
100. Which bacteria belong to the diphtheroid group? (2 examples)
- Corynebacterium pseudodiphtheriticum*, *Corynebacterium ulcerans*, *Corynebacterium minutissimum*, *Corynebacterium urealyticum*.
101. What are the diseases caused by *Listeria monocytogenes*?
- Meningitis, sepsis, granulomatosis infantiseptica.
102. What are the diseases caused by *Listeria monocytogenes* in adults?
- Gastrointestinal symptoms, meningitis, sepsis, endocarditis
103. What is the treatment of Listeriosis?
- Ampicillin-gentamicin is the drug of choice.
104. What is the causative agent of erysipelas?
- Erysipelothrix rhusiopathiae*.
105. Which bacteria can cause dental decay?
- Lactobacilli and *Streptococcus mutans*.

106. Which bacteria can cause human tuberculosis? (3 examples)
  - a. *Mycobacterium tuberculosis*, *Mycobacterium bovis*, *Mycobacterium africanum*.
107. What kind of staining can be used to stain mycobacteria?
  - a. Ziehl-Neelsen staining.
108. How long can be cultivated the causative agent of human tuberculosis on Lowenstein-Jensen culture media?
  - a. 6-8 weeks.
109. How can be prevented the human tuberculosis?
  - a. By BCG vaccine.
110. What are the facultative pathogenic mycobacteria? (2 examples)
  - a. *Mycobacterium avium* complex, *Mycobacterium kansasii*, *Mycobacterium marinum*, *Mycobacterium ulcerans*.
111. Which mycobacteria is apathogenic?
  - a. *Mycobacterium smegmatis*.
112. What is the causative agent of leprosy?
  - a. *Mycobacterium leprae*.
113. What are the types of leprosy?
  - a. Tuberculoid and lepromatous leprosy.
114. What is the treatment of leprosy?
  - a. Dapsone, clofazimine, rifampicin.
115. How can *Nocardia* stain?
  - a. It is Gram-positive and Ziehl-Neelsen positive
116. What are the most important *Actinomyces* species? (1 example)
  - a. *Actinomyces israelii*, *Actinomyces naeslundii*, *Actinomyces odontolyticus*.
117. Which *E. coli* can be toxin producer? (3 examples)
  - a. ETEC, EPEC, EAEC, EIEC, EHEC
118. What kind of extra intestinal disease can be caused by *Escherichia coli*?
  - a. Urinary tract infections, neonatal meningitis, sepsis.
119. What are the causative agent of typhoid fever? (4 examples)
  - a. *Salmonella Typhi* and *Salmonella Paratyphi* A, B, C.
120. Which bacteria can cause salmonellosis?
  - a. *Salmonella Enteritidis*, *Salmonella Typhimurium*, *Salmonella Choleraesuis*
121. What is the causative agent of dysentery? (2 examples)



- a. *Shigella dysenteriae*, *Shigella flexneri*, *Shigella sonnei*.
122. Which bacterium is the causative agent of plague?
- a. *Yersinia pestis*.
123. What is the spreading way of the plague?
- a. By the bite of the rat flea, by respiratory droplets.
124. What are the diseases caused by *Klebsiella pneumoniae*?
- a. Lobar (Friedländer) pneumonia, wound infection, bloodstream infection, urinary tract infection.
125. What is the causative agent of cholera?
- a. *Vibrio cholerae*
126. What kind of *Vibrio* species can cause human diseases? (3 examples)
- a. *Vibrio cholera*, *Vibrio parahaemolyticus*, *Vibrio vulnificus*.
127. What are the characteristic biochemical properties of *Pseudomonas aeruginosa*?
- a. Obligate aerobic, oxidase positive.
128. Colony morphology of *Pseudomonas aeruginosa*?
- a. Bacteria can produce water-soluble pigment that stain the culture media, the colonies have grape like smells.
129. Microscopic morphology of *Pseudomonas aeruginosa*?
- a. Gram-negative rod.
130. What are the most frequent diseases caused by *Pseudomonas aeruginosa*?
- a. Nosocomial lung infections, wound and blood stream infections.
131. What is the treatment of the diseases cause by *Pseudomonas aeruginosa*?
- a. Multiresistant, based on antibiogram.
132. What is the most common source of the infection caused by *Acinetobacter baumannii*?
- a. Hospital environment.
133. What does MACI mean in microbiology?
- a. Multiresistant *Acinetobacter baumannii*
134. What is the most common source of the infection caused by *Stenotrophomonas maltophilia*?
- a. Nosocomial lung infection, sepsis.
135. What is characteristic for antibiotic sensitivity of *Stenotrophomonas maltophilia*?
- a. Multiresistant.
136. How can *Legionella pneumophila* spread?

- a. By aerosol.
137. What is the diagnosis of Legionellosis?
- a. By serology from blood, by immune chromatography from urine.
138. Which bacterium can cause chronic gastritis or stomach ulcer?
- a. *Helicobacter pylori*.
139. What is the most important cultivable anaerobic member of the normal flora of the large bowel?
- a. *Bacteroides fragilis*.
140. Which genera belongs to the Spirochaetales order?
- a. *Treponema*, *Borrelia*, *Leptospira*.
141. What are the causative agents of Plaut-vincent angina?
- a. *Treponema vincentii* and *Fusobacteria*.
142. What is the causative agent of syphilis?
- a. *Treponema pallidum* subspecies *pallidum*
143. How can syphilis spread?
- a. By sexual contact, transplacental, by blood transfusion and by organ transplantation.
144. What is the first symptom in syphilis?
- a. Ulcus durum – painless hard ulcer, enlarged lymph nodes.
145. In which stage of the syphilis can appear rash all over the body?
- a. 2<sup>nd</sup> stage.
146. In which stages is syphilis contagious?
- a. 1<sup>st</sup> and 2<sup>nd</sup> stages and in the first 2 years of the latency. At 3<sup>rd</sup> stage only in utero infections may occur.
147. When can develop neurosyphilis during the infection?
- a. In all stages of the diseases can develop neurosyphilis.
148. What is the specific diagnosis of the syphilis?
- a. ELISA, TPHA, TPPA
149. When can be used non treponemal serological reactions during the infection?
- a. RPR and VDRL is used to determine the stages of syphilis
  - b. To detect the reinfection
  - c. To control the effectiveness of the therapy
150. What are the non-specific treponemal serological reactions?
- a. RPR and VDRL
151. What kind of diseases can be caused by *Borrelia*?

- a. Lyme diseases and relapsing fever
- 152. How can the Lyme disease spread?
  - a. By the bite of tick.
- 153. What are the causative agents of Lyme disease? (2 examples)
  - a. *Borrelia burgdorferi*, *Borrelia afzelli*, *Borrelia garini*
- 154. What is the causative of epidemic relapsing fever?
  - a. *Borellia recurrentis*.
- 155. What is the vector of Lyme diseases?
  - a. Tick
- 156. What is the vector of *Borrelia recurrentis*?
  - a. Body louse
- 157. What is the molecular background of relapsing fever?
  - a. Bacterial antigen changing.
- 158. What is the first symptom of Lyme diseases?
  - a. Erythema chronicum migrans
- 159. What is the causative agent of Weil's diseases?
  - a. *Leptospira icterohaemorrhagiae*.
- 160. What are the characteristic properties of the meningitis caused by *Leptospira*?
  - a. Serosus, non-purulent.
- 161. What is the source of the infection caused by *Leptospira*?
  - a. Zoonotic diseases, can spread by the urine of animals.
- 162. How can the Lyme diseases diagnosed?
  - a. By serology, ELISA screening test and for confirmation immunoblot is used.
- 163. Which bacteria cannot have cell wall?
  - a. *Mycoplasma*, *Ureaplasma*.
- 164. Which bacteria can cause atypical pneumoniae?
  - a. *Mycoplasma pneumoniae*, *Chlamydomphila pneumoniae*, *Legionella pneumophila*.
- 165. What is the causative agent of typhus exanthematicus?
  - a. *Rickettsia prowaczekii*
- 166. What is the causative agent of Q-fever?
  - a. *Coxiella burnettii*
- 167. What is the causative agent of parrot fever?
  - a. *Chlamydomphila psittaci*.

168. What is the causative agent of trachoma?  
a. *Chlamydia trachomatis*, serotype A-C.
169. What kind of disease can be caused by *Chlamydia trachomatis* serotype L1-L3?  
a. Lymphogranuloma venereum.
170. What is the effect of the bacterial AB exotoxins?  
a. They are: neurotoxins, protein synthesis inhibitors or ion secretion enhancers.
171. What is the effect of the cholera toxin?  
a. Increasing of the cAMP, enhancing the ion secretion
172. What are the causative agents of impetigo contagiosa?  
a. *S.aureus*, *S.pyogenes*
173. What is the causative agent of erysipelas?  
a. *Streptococcus pyogenes*
174. What is the causative agent of Trachoma?  
a. *Chlamydia trachomatis* A,B,C
175. What is the causative agent of Ophthalmoblenorrhoea neonatorum?  
a. *Neisseria gonorrhoeae*
176. List 4 capsulated bacteria from the list below!  
a. *Streptococcus pneumoniae*, *Streptococcus agalactiae*, *Streptococcus pyogenes*, *Escherichia coli*, *Haemophilus influenzae*, *Neisseria meningitidis*, *Listeria monocytogenes*
177. How many percentage of the adults are carrier of *Staphylococcus aureus*?  
a. 20-30%
178. How many different kind (serotype) of capsule can be produced by *Streptococcus pneumoniae*?  
a. 94 (accepted answer: 90-100)
179. What is the most common causative agent of community acquired pneumonia?  
a. *Streptococcus pneumoniae*
180. What kind of vaccines can be used to prevent invasive diseases caused by *Streptococcus pneumoniae*  
a. Prevenar-13: *Streptococcus pneumoniae* 13 type of capsule conjugated to toxoid – recommended for new-borns and in elderly  
b. Pneumovax: *Streptococcus pneumoniae* 23 type of capsule – recommended for adults and teenagers.