E-visitation of practicals

A small guide to practical examination by Zahradníček

This is the survey of the most imporant things. Nevertheless, you can be asked everything from practical sessions of both Microbiology I and Microbiology II.

Microscopy

- Gram staining
  - to be able to perform it
  - to be able to observe a preparation and to identify G+/G- cocci/bacilli (+arrangement), yeasts, epithelial cells, WBCs
  - to know the principle
- Wet mount, other staining methods perfomed in practicals (survey)
- (Ziehl-Neelsen staining, see Acid fast bacteria)
- Interpretation of microscopical findings (importance of epithelial cells, leucocytes)

Culture

- Most important culture media
  - to be able to recognize blood agar, Endo agar and Mueller Hinton agar
  - to be able to describe function of all fourteen media from J03
- Inoculation (to be able to inoculate a strain/a swab)
- Description of colonies (practically)

Biochemical identification

- Catalase test
  - to be able to do it
  - to understand its practicle
  - to be able to give an example of its use in diagnostics
- Strip tests
  - to know the most important ones (oxidase, PYR, INAC) and to give examples of using them
  - to be able to use them practically (incl. reading the results)
- Hajna, MIU and similar tests
  - to know their practical use and what do they detect
- Enterotest-like tests
  - to be able to read an Entero- (Staphy- ...) –test and to describe its principle

Outer influences, disinfection and sterilisation

- To know the safety rules in the laboratory
- To know the most common disinfectants and sterilization methods and the way they are used (chloramin, NaOCl, $Ca(OCl)_2$, iodine-povidone, hydrogen peroxide, peracetic acid, ajatin, UV-rays disinfection, hot air sterilisation, steam sterilization, radiation sterilization)
- To understand the methodological difference between testing of growth limit and survival limit
- To be able to read corresponding tests (see Task 1 from P06)
- To know how effect of disinfection and sterilization can be tested

Antimicrobial drugs

- To know principles of microdilution test, diffusion disk test and E-test, to be able to read the results of all of them and to interprete them
- To understant the importance of MIC and its comparison with breakpoint level
- To know basic methods of testing factors of resistance (betalactamases)

Serological tests (J07 to J10)

- To be able to read the results any of these tests; students will get the necessary information (dillution in the first well, c. o. counting in ELISA etc.)
- To be able to describe the basic indication for the test and to interprete these results in combination with other parameters; including ASO!
- To understand principle of antigen/analysis reactions and its use for antigen detection in a specimen/antigen analysis of a strain/antibody detection
- To understand major interpretation difference between direct and indirect diagnostical methods
- To know principles of agglutination, precipitation, agglutination on carriers, CFT, neutralisation (ASO, HIT, VNT), reactions with labelled components, western blotting, incl. differences between them
- To understand titers, titer dynamics, seroconversion, importance of IgM/IgG (and knowing what reactions enable their detection – importance of conjugate), avidity (A-wishing students)
- To be able to construct a scheme of HBsAg and anti-HBs testing
- To understand terms "heterophilic antibodies" and "anticomplementarity test"

Detection of nucleic acid

- To know the basic indication for these methods in microbiology
- To understand the difference between methods with/without amplification
- To know basic principle of the reaction, including two major ways of product detection
- To understand the imporance of internal control
- To be able to read practically a PCR result (on a picture), including IC result interpretation

Virology

- To know the ways of isolation of a virus (including individual structures of a fertilized egg)
- To be able to differenciate a cell culture with/without CPE (in easy cases only) and to understand, what a CPE is
- (plus serology: HIT, VNT, see serology)

Easily culturable bacteria and yeasts (P01–P06; P10)

- To be able to find out (and utilize practically) a diagnostic algorithm to identify common bacteria except G+ rods (*Staphylococcus aureus,* coagulase-negative staphylococci*, Streptococcus pyogenes, S. agalactiae, S.* non-A-non-B*, S. pneumoniae,* oral streptococci*, Enterococcus faecalis, E. faecium, Escherichia coli, Klebsiella pneumoniae, Salmonella enterica, Proteus* sp., *Pseudomonas aeruginosa*, other G- non-fermenters, *Haemophilus influenzae, H. parainfluenzae, Pasteurella multocida, Neisseria gonorrhoeae, Neisseria meningitidis,* oral neisseriae, *Moraxella catarrhalis, Candida albicans, Candida* sp.)
- For G+ rods: to know their main characteristics; to be able to identify practically coryneform rods according to their pallisade arrangement

Anaerobic bacteria

- To be able to describe an anaerobic jar and an anaerobic box, their parts and their function
- For clostridia: to know their main characteristics; to be able to identify *C. tetani* according to its sphaerical terminal endospore

Acid-fast rods

- To know the principle of Ziehl-Neelsen staining, to be able to distinguish between pictures of positive and negative findings and pictures stained using other staining methods
- To know the principles of acid-fast rod culture, to know basic media, to be able to distinguish pictures of positive findings/negative findings/pictures describing something other

Spiral bacteria

- To explain use (and complications in use) of direct methods in spirochete diagnostics
- To understand screening/confirmatory reactions for *Borrelia* and *Treponema*
- To be able to read and interprete the tests (see also Serology)

Fungi

- To know basic diagnostic methods used in mycology
- To be able to read a microprecipitation test for lung aspergillosis and to explain its principle
- To know the basic principles of sampling for mycology
- See also „Easily culturable bacteria and yeasts (P01–P06; P10)“

Parasites

- To know basic methods for parasites (Faust, Kato, Graham; thick and thin smear; C. A. T. swab and Giemsa stained smear for trichomonas; indirect diagnostics of tissue parasites)
- To be able to distinguish the most common helmint eggs (tapeworm, pinworm, common roundworm, Trichuris) and tapeworm proglottid
- To know the basic principles of sampling for parazitology

Biofilm

- To know the diagnostic methods of biofilm detection
- To know the difference bethween three most typical methods of venous catether microbiological diagnostic
- To be able to read the results of a biofilm : glucose/time experiment (see P12 Task 4)
- To be able to read MBEC values and to interprete the result (in comparison with MIC)

Clinical microbiology

- To be able to find a pathogen in phagyngeal flora (and to know the composition of normal pharyngeal flora, and common pharyngeal pathogens)
- To be able to read a result of urine culure semiquantitatively and qualitatively
- For a simple mini-casuistics, to be able to find out the best sampling method, including finding the best swab or container (practically)
- To understand basic principles of sampling under various circumstances

The taks could be rather practical (e. g. „Gram stain a given strain“, „Read the results of an Enterosest“, „Read and interprete results of tests for syphilis“) or more theoretical („Among three given strains, find a Staphylococcus and determine more precisely“ – here majority of steps would be done only „orally“).

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