

# Microbiology curriculum

## Bacteriology

2<sup>nd</sup> year medical students

I semester

Lectures

2 hours/week (14 weeks)

1. The object and purpose of medical microbiology. History of microbiology.
2. Bacterial morphology. Bacterial cell structure. Chemical composition of bacteria. Growth and multiplication of bacteria. Physical, chemical and biological factors affecting bacteria. Bacterial genetics.
3. Pathogenesis of bacterial infections. Host defense mechanisms. Immunity. Hipersensitivity reactions. Prevention of infectious diseases.
4. Bacterial classification and nomenclature. Gram-positive cocci (Staphylococcus genus, Streptococcus genus, Enterococcus genus).
5. Gram-negative cocci (Neisseria gonorrhoeae, Neisseria meningitidis). Gram-positive rods (Corynebacterium diphtheriae, Bacillus anthracis, Listeria genus).
6. Gram-negative enteric rods (Escherichia coli, Shigella genus, Salmonella genus, Klebsiella genus, Proteus genus, Yersinia genus).
7. Gram-negative non-fermenting rods (Pseudomonas aeruginosa, Acinetobacter genus). Gram-negative curved rods (Vibrio cholerae, Helicobacter pylori, Campylobacter genus)
8. Fastidious, Gram-negative coccobacilli involved in respiratory tract infections (Haemophilus genus, Bordetella pertussis, Legionella genus)
9. Non-spore-forming anaerobic bacteria. Spore-forming anaerobic bacteria (Clostridium genus) - TBL
10. Bacteria not stained by Gram (Treponema pallidum, Borrelia genus, Leptospira genus, Mycobacterium tuberculosis, Mycoplasma genus, Chlamydia genus) – integrated lecture
11. Human microbiota. Specimens collected for bacteriology.
12. Diagnostic principles in infectious diseases according to localization (respiratory tract, urogenital, digestive tract infections, skin and soft tissue infections). Bloodstream infections – blood cultures. Infections caused by anaerobes.
13. Antibiotic susceptibility testing. Antimicrobial resistance.
14. Nosocomial infections. Emergent and reemergent infectious diseases. Bioterrorism.

## Practical activities

I<sup>st</sup> semester

2 hours/week (14 weeks)

1. Laboratory safety rules. Microbial growth control.
2. Diagnostic algorithm in bacteriology. Specimen collection and shipment.
3. Study of bacterial morphology. Wet mount. Smears. Staining techniques (simple stain, Gram stain, acid-fast stain, Neisser stain)
4. Cultivation of bacteria. Culture media. Inoculation techniques. Colony morphology. Identification of bacteria according to their biochemical patterns.
5. Diagnostic methods based on antigen-antibody reactions (agglutination, precipitation, immunofluorescence, enzyme-linked immunosorbent assay, Western blot). Detection of bacterial nucleic acid (hybridization, polymerase chain reaction). Methods used for bacterial typing. Gene transfers.
6. Antibiotic susceptibility testing. Pathogenicity tests (in vivo and in vitro tests)
7. Practical exam
8. Diagnosis of infections caused by: Staphylococcus spp., Streptococcus spp. and Enterococcus spp.
9. Diagnosis of infections caused by Gram-negative enteric rods: Escherichia coli, Klebsiella spp., Proteus spp., Shigella spp., Salmonella spp., Yersinia spp. Laboratory diagnosis of cholera.
10. Diagnosis of infections caused by Gram-negative non-fermentative rods (Pseudomonas aeruginosa, Acinetobacter spp.). Diagnosis of infections caused by Bacillus genus. Diagnosis of infections caused by anaerobic bacteria (exogenous, endogenous anaerobes).
11. Diagnosis of infections caused by Haemophilus spp., Neisseria spp. Diagnosis of syphilis. Diagnosis of tuberculosis.
12. The human microbiota. Diagnosis of infections (respiratory and digestive tract infections, urogenital infections, skin and soft tissue infections, meningitis, systemic infections). Control of cross-transmission in hospital setting in order to prevent nosocomial infections.
13. Review
14. Practical exam



## References

1. Brooks G.F., Butel, J. S., Morse, S.A.: Jawetz, Melnick, Adelberg's Medical Microbiology, 23 rd edition. 2006
2. Greenwood D., Slack RCB, Peutherer JF: Medical Microbiology. A guide to microbial infections: pathogenesis, immunity, laboratory diagnosis and control. 16<sup>th</sup> edition, Churchill Livingstone, 2002.
3. Joklik W.K., Willet H.P., Amos D.B., Wilfert C.M., Zinsser – Medical Microbiology 20<sup>th</sup> edition, Appleton&Lange, 1992
4. Kayser FH, Bienz KA, Eckert J, Zinkernagel RM: Medical Microbiology, Georg Thieme Verlag, Stuttgart, 2005
5. Koneman: Color Atlas and Textbook of Diagnostic Microbiology, Lippincott, 2006
6. Levinson W: Medical Microbiology and Immunology. 8<sup>th</sup> edition, Lange Medical Books, 2004
7. Murray, P.R., Rosenthal, K.S., Kobayashi, G.S., Pfaller, M.A.: Medical Microbiology, Fourth Edition. Mosby 2002

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