

Course title

Microbiological methods in dental medicine

Department

Department of Medical microbiology and parasitology, School of Medicine University of Zagreb

Address Šalata 3

Total ECTS points 6

Course leader

Prof. Ana Budimir, MD; PhD

Course associates

Assist prof Sanja Pleško

Assoc prof Ivona Bago

Assoc prof Dragana Gabrić

Teaching plan

	No. classes
Lecture	6
Seminar	14
Practical	10
Total	30

1 class = 45 minutes

Course description

Microbiological methods in dental medicine is a part of Postgraduate doctoral study of Dental Medicine. The course offers an overview of microbiome in oral cavity, principles of detection of microorganisms in dental plaque, caries and periodontal disease pathogens. Methods of detection and identification of pathogens significant for infections of oral cavity, salivary glands and distant infections are also incorporated in the course.

Students will learn principles and methods of sampling for cultivation and molecular detection of bacteria and fungi in oral cavity (swabs, paper point, aspirates). The role of transport containers, preservative fluids and gels will be addressed for fastidious and anaerobic bacteria significant in dental medicine, as well as principles of storage and transport for molecular detection. The course content contains basic principles of cultivation of aerobic and anaerobic bacteria in dental medicine, and procedures for quantification of bacteria and fungi. Special attention will be paid to morphological differentiation of microorganisms, automated systems, VITEK2 and MALDI TOF. Biofilm is an important subject in dental medicine, and will be investigated in details: pathogenesis, prerequisites for biofilm, survival, visualisation, prevention of growth, and removal. Molecular microbiology methods, especially PCR; RT-PCR and sequencing will be addressed in various teaching forms. A part of course content is also a direct detection of resistance genes in dental samples.

Learning outcomes

1. Upon completion of the course, students will be able to identify and describe basic conventional and modern microbiological methods used for detection of pathogens in dental medicine
2. Will be able to appraise different terms in metagenomics, and genetic analysis of microorganisms in oral cavity.
3. Students will be able to interpret various results of microbiological analyses and tests, and differentiate significant pathogens from opportunistic ones.
4. Will be able to explain the conditions for biofilm formation, to recognize biofilm visualized by different techniques
5. Students will be able to compare and evaluate different microbiological approaches and techniques in scientific publications in the field of dental medicine.

Course content

Lecture

	Lecture topics	Number of classes/hours
1.	Introduction to microbiological methods	1
2.	Microbiota, microbiome, resistome in oral cavity	1
3.	Application of conventional microbiological methods and molecular microbiology methods in dental medicine	
4.	Microbiological aspects and characteristics of biofilm in dental medicine	
5.		1
6.		1
7.		
8.		
9.		1
10.	-	-

1 sat = 45 minuta

Seminari

	Seminar topics	Number of classes/hours
1.	Methods for biofilm detection, principles of diagnostics, biofilm visualisation methods	-
2.	Biofilm in endodontics	-
3.	Dental implants and biofilm	-
4.	Prevention of biofilm formation, biofilm removal methods, in vivo and in vitro	-
5.	Principles of MALDI-TOF technology in dental microbiology	-

6.	Identification of microorganisms –biochemical methods and protein analysis	-
7.	The choice of methods for testing of sustainability and viability of microorganisms	-
8.	-	-
9.	-	-
10.	-	-

1 sat = 45 minuta

Vježbe

	practicals topics	Number of classes/hours
1.	Research planing and use of microbiological methods in dental medicine	-
2.	Sample preparation, sampling and storage for microbiology analysis	-
3.	Removal of the intracanal biofilm	-
4.	Preparation of strains for biofilm formation	-
5.	Principles of sampling, preparation, isolation and purification of NA for molecular diagnostic	-
6.	PNA FISH technique for biofilm detection	-
7.	Quantification of microorganisms-macro and micro-dilution	-
8.		-
9.		-
10.		-

1 class = 45 minutes

Literature

Molecular Oral Microbiology

Publisher: Caister Academic Press

Edited by: Anthony H. Rogers

2008. ISBN: 978-1-904455-24-0

The Root Canal Biofilm

Luis E. Cha'vez de Paz • Christine M. Sedgley • Anil Kishen-Editors

Springer Series on Biofilms

ISBN 978-3-662-47414-3 ISBN 978-3-662-47415-0 (eBook)

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Molecular Medical Microbiology

3rd Edition - May 1, 2022

Editors: Yi-Wei Tang, Musa Hindiyeh, Dongyou Liu, Andrew Sails, Paul Spearman, Jingren Zhang
ISBN: 9780128186190

Molecular microbiology : diagnostic principles and practice

David H Persing, Fred C. Tenover, Randall T. Hayden, Greet Ieven, Melissa B. Miller, Frederick S. Nolte
ASM Press, Washington, DC

CV (curriculum vitae) and bibliography of course leader

III.		
1.	Name and surname:	Ana Budimir
2.	Title:	PhD, prof., MD
3.	Teaching / scientific degree:	Full professor
4.	Date of the last teaching / scientific degree obtained:	January 2019
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9.	CV:	<p>Adte of birth: March 13th 1973</p> <p>Employment:</p> <p>2021- present: Head of the Department of Clinical and Molecular Microbiology, University Hospital Centre Zagreb,</p> <p>2013-2019- associated professor School of Medicine, Department of medical microbiology and parasitology,</p> <p>2009- 2021, Department of cilinical and molecular microbiology,</p> <p>Head of the Laboratory for diagnostics, typing and surveillance of hospital infections typing of bacterial pathogens, hospital-acquired infections,</p> <p>2008-2013.- University of Zagreb School of Medicine, Assistant professor, Medical microbiology</p> <p>2006-2009, University Hospital Centre Zagreb, Clinical microbiologist</p> <p>2002 -2006 , specialization in Clinical microbiology, 1997-2000, Health Center Medveščak Zagreb, internship -General medicine</p> <p>Research projects: collaborator in Croatian science foundation: InWaShed-MP " HRZZ- IP-2020-02-7575, since February 2021. godine HRZZ Research Project (IP-11-2013) Advanced textile materials by targeted surface modification, Acronym: ADVANCETEX. Principal Investigator (PI): Sandra Bischof, University of</p>

		<p>Zagreb Faculty of Textile Technology, Review expert for Training strategies in infection control in Europe (TRICE-IS) od 2014.</p> <p>Laboratory coordinator for Croatia in APRES (Appropriateness of prescribing in primary health care in Europe with respect to antibiotic resistance) FP7 framework.</p> <p>National coordinator of project PROHIBIT- Prevention of Hospital Infections by Intervention and Training, FP7, National representative for TRICE (Project Infection Control Training Needs Assessment in Europe), ECDC-a (European Centre for Disease Control and Prevention), Stockholm. Over 80 publications in CC journals, 1463 citation, H index -16. Scientific interests: molecular detection of antimicrobial resistance, healthcare associated infections. Teaching: Coordinator of PhD course in Faculty of Dental medicine, Zagreb. Teaching in courses in microbiology, HCAI, quality of care, infectious diseases, epidemiology, and related subjects, for graduate and postgraduate students.</p>
10.	Selected publications:	<ol style="list-style-type: none"> 1. Sealing Efficacy of the Original and Third-Party Custom-Made Abutments-Microbiological In Vitro Pilot Study. Smojver, I, Bjelica, R, Catic, A; Budimir, A Vuletic, M, Gabric, D. MATERIALS.Volume15.Issue4.Article Number1597 DOI10.3390/ma15041597. PublishedFEB 2022 2. Evaluation of sealing ability of four bioceramic root canal sealers and an epoxy resin-based sealer: An in vitro study. Vukmanovic, L ; Antunovic, M ; Budimir, A ; Kabil, E ; Anić, I ; Bago, I. Saudi Endodontic Journal (1658-5984) 11 (2021), 1; 66-72 3. Short-Term Antibacterial Efficacy of Three Bioceramic Root Canal Sealers Against Enterococcus Faecalis Biofilms. Munitic, MS, Budimir, A Jakovljevic, S, Anic, I; Bago, I ACTA STOMATOLOGICA CROATICA, Volume54, Issue1 Page3-9. DOI10.15644/asc54/1/1 4. The photo-activated and photo-thermal effect of the 445/970 nm diode laser on the mixed biofilm inside root canals of human teeth in vitro: A pilot study. Katalinić I, Budimir A, Bošnjak Z, Jakovljević S, Anić I. Photodiagnosis Photodyn Ther. 2019 Jun;26:277-283. doi: 10.1016/j.pdpdt.2019.04.014. Epub 2019 Apr 14. 5. Antimicrobial Efficacy of Photodynamic Therapy and Light-Activated Disinfection Against Bacterial Species on Titanium Dental Implants. Azizi B, Budimir A, Mehmeti B, Jakovljević S, Bago I, Gjorgievska E, Gabrić D. Int J Oral Maxillofac Implants. 2018 Jul/Aug;33(4):831-837. doi: 10.11607/jomi.6423. 6. Clinical and Salivary Findings in Patients with Different Types of Orthodontic Brackets. Jurela, A; Sudarevic, K ; Budimir, A; Brailo, V , Brzak, BL, Jankovic, B. ACTA STOMATOLOGICA CROATICA. Volume53. Issue3. Page224-230 DOI10.15644/asc53/3/4