Academic year 2021./2022.

Course title: Investigation of laser influence on biomechanical properties of dental materials and hard dental tissues

Department: Department of Endodontics and Restorative Dentistry

Address School of Dental Medicine, University of Zagreb, Gunduliceva 5, 10000 Zagreb

Total ECTS points: 3

Course leader: Assocciate professor Anja Baraba

Course associates: Professor Ivana Miletić, Assocciate professor Dragana Gabrić

Teaching plan

	No. classes
Lecture	4
Seminar	5
Practical	6
Total	15

1 class = 45 minutes

Course description

Course «Investigation of laser influence on biomechanical properties of dental materials and hard dental tissues » provides knowledge on basic principles and methods of *in vitro* and *in vivo* studies about influence of laser on hard dental tissues and biological properties of materials in dental medicine. During lectures, students of PhD program will be introduced to different methods for investigating influence of laser on mechanical and biological properties of materials in dental medicine. In lectures, possibilites and limitations of specific scientific methods and application of certain mehodologies will be explained. The aim of the seminars is to introduce students to different possibilities of clinical application of lasers according to scientific data. During seminars, influence of laser on bond strength of bioactive and fiber reinforced materials will be assessed. During practical part of the course, students will have the possibility, during laboratory work, to be introduced to different types of lasers and possibilites of *in vitro* and *in vivo* investigations.

Learning outcomes

1. Describe different methods for laser application
2. Display different methods for investigating influence of laser on hard dental tissues
3. Explain possible influence of laser on bonding of bioactive and fiber reinforced materials in dental medicine
4. Compare the influence of different lasers on bond strength of bioactive and fiber reinforced materials in dental medicine

Course contet

Lecture

	Lecture topics	**Number of classes/hours**
1.	Basics of laser application in dental medicine	1
2.	Studies on influence of laser on application of materials in dental medicine	1
3.	Possibilites of erbium lasers in endodontic surgery	1
4.	Antimicrobial photodynamic therapy in endodontic surgery	1
5.	-	-
6.	-	-
7.	-	-
8.	-	-
9.	-	-
10.	-	-

1 sat = 45 minuta

Seminari

	Seminar topics	**Number of classes/hours**
1.	Choice of methods for investigating influence of lasers on biomechanical properties of hard dental tissues	1
2.	Clinical application of lasers according to scientific data	2
3.	Influence of laser on bond strength of bioactive materials to hard dental tissues	2
4.	-	-
5.	-	-
6.	-	-
7.	-	-
8.	-	-
9.	-	-
10.	-	-

1 sat = 45 minuta

Vježbe

	practicals topics	**Number of classes/hours**
1.	Laser-activated irrigation before placement of bioactive and fiber reinforces materials	2
2.	Application of photo-activated disinfection	2
3.	Preparation of samples for bond strength testing of bioactive and fiber reinforced materials to hard dental tissues	2

4.	-	-
5.	-	-
6.	-	-
7.	-	-
8.	-	-
9.	-	-
10.	-	-

1 class = 45 minutes

Literature

Coluzzi DJ. Fundamentals of lasers in dentistry: basic science, tissue interaction, and instrumentation. J Laser Dent 2008;16:4-10.

Verma SK, Maheshwari S, Singh RK, Chaudhari PK. Laser in dentistry: An innovative tool in modern dental practice. Natl J Maxillofac Surg 2012;3:124-132.

Van As G. Erbium lasers in dentistry. Dent Clin N Am 2004;48:1017-1059.

Saltz U, Bock T. Testing adhesion of direct restoratives to hard dental tissues- a review. J Ahes Dent 2010;12:343-371.

Gabrić D, Baraba A, Batinjan G, Blašković Marko; Vučićević Boras V, Filipović Zore I, Miletić I, Gjorgievska E. Advanced Applications of the Er:YAG Laser in Oral and Maxillofacial Surgery. A Textbook of Advanced Oral and Maxillofacial Surgery. Volume 2. Motamedi, Mohammad Hosein Kalantar (ur.).Rijeka : InTech, 2015. str. 799-838.

CV (*curriculum vitae*) and bibliography of course leader

Anja Baraba was born on November 19, 1981 in Split. She finished elementary school and high school in Split. She completed her undergraduate studies in dentistry at the School of Dental Medicine, University of Zagreb, with a grade point average of 4.94. She defended her graduation thesis in the field of dental pathology in 2006. During her studies, she was a demonstrator at the Department of Histology and Embryology, School of Dental Medicine in Zagreb. She won the Dean's Awards in 2002, 2003 and 2004 and the Dean's Award in 2005 for academic achievement. In 2001, she received a scholarship from the Ministry of Science, Education and Sports for gifted students (category A), and in 2005 f "Top Scholarship for Top Students" (Nacional). She passed the professional exam in 2007. Since October 2007, he has been working at the Department of Endodontics and Restorative Dentistry, School of Dental Medicine, University of Zagreb as a young researcher for scientific project "Experimental and Clinical Endodontics". She enrolled in the postgraduate doctoral study of dentistry in the academic year 2007/08. She began her specialization in endodontics and restorative dentistry in October 2010. and passed the specialist exam in 2013. She enrolled in the postgraduate professional study of dentistry in the academic year 2010/11. and finished the same in 2014 with a grade point average of 5.00. In 2009 she received a Coimbra Group Hospitality Scheme Grant Scholarship from the University of Siena, Italy, where she conducted part of the research for her dissertation. She completed her doctoral studies in 2011 with a grade point average of 5.00, and defended her dissertation entitled "Comparison of the effectiveness of Erbium-yttrium-aluminum-garnet laser beam and dental bur for dentin removal" on May 23, 2011. In

the same year, she was elected senior assistant at the Department of Endodontics and Restorative Dentistry, School of Dental Medicine in Zagreb. She was elected a research associate in 2011. and a senior research associate in 2012. She was elected assistant professor in 2014. She was elected to the scientific title of scientific advisor in 2018. In 2019., she was elected associate professor. She actively participates in the teaching of all courses at the Department of Endodontics and Restorative Dentistry, and also participates in the teaching of Dental Medicine in English language. He is the head of the course at the postgraduate specialist study "Application of fiber-reinforced materials in dental medicine" at the School of Dental Medicine, University of Zagreb. She is also the head of the course at PhD program under title"Investigation of the impact of lasers on the biomechanical properties of dental materials and hard dental tissues". She aslo participates in the course of PhD program under title "Testing of biological and technological properties of materials for root canal filling". She is a member of the Croatian Chamber of Dental Medicine, the International Association for Dental Research (IADR), the Croatian Medical Association and the secretary and member of the Croatian Society for Minimal Intervention Dental Medicine. She actively participated in several scientific projects, but was also the head of University research grants in 2020. entitled "Mechanical properties of bioactive materials in *in vivo* and *in vitro* conditions" and in 2021. "Assessment of the properties of endodontic and restorative materials in *in vivo* and *in vitro* conditions". She is the author of 33 publications in the Web of Science Core Collection database, of which 23 publications are indexed in the Current Contents database. She has a total of 222 independent citations and an h-index of 9. She is the author of three chapters in a university textbook, one chapter in a scientific book and has participated in the translation of two university textbooks. She has reviewed one book (Zarow M. Postendodontic tooth restoration) and scientific articles for the journals Photomedicine and Laser Surgery and the Journal of Public Health Dentistry. She is the winner of the award for the best rated teacher in year 2014/15. and 2018, and in 2012 she was awarded as one of the 20 most successful young researchers at the University of Zagreb. She actively participated in several domestic and international scientific and professional conferences and held invited lectures in Zagreb (Croatia), Belgrade and Novi Sad (Serbia), Tel Aviv (Israel), Moscow (Russia), Skopje (Macedonia) and Budapest (Hungary). She has participated in the organization of scientific and professional conferences at three international congresses, twice as editor and member of the scientific committee and once as editor. She has actively participated in several domestic and one international scientific project, and during her scientific research work she has successfully collaborated with the universities of Graz (Austria), Milan and Siena (Italy), Boston (USA), Belgrade (Serbia) and Izmir (Turkey).

Bibliography:
https://www.bib.irb.hr/pretraga?operators=and|Baraba,%20Anja%20(25715)|text|profile