Academic year 2021./2022.

Course title Determination of fluoride content in tooth enamel after topical application of fluoride preparations

Department Department of Pharmacology

Adress Salata 11, Zagreb

Total ECTS points

Course leader Assoc.prof. Kristina Peros

Course associates

Teaching plan

	No. classes
Lecture	3
Seminar	6
Practical	6
Total	15

1 class = 45 minutes

Course description

Understanding the mechanism of action of topically applied fluorides in caries prevention contributes to the rational use of currently best existing preventive procedures for caries preventive care for an individual patient. The physical and chemical interactions of fluoride with enamel are well known and described in the contemporary literature. The role and influence of calcium fluoride and fluorapatite on the processes of demineralization and remineralization of teeth are partly dependent on individual patient factors and characteristics of the oral environment. The dose / response ratio and the factors influencing the determination of the dose responsible for the beneficial / detrimental effect of fluorine can be well illustrated in an experimental setting. Fluorides in oral fluids and dental plaque, along with other minerals required for remineralization processes, can be determined by a variety of analytical methods. The relationship between fluorine concentration in topical preparations, their acidity, frequency of use and the presence of calcium ions on the formation of alkaline soluble fluorides (CaF2) and the formation of "tightly bound“ fluorides in tooth enamel, with appropriate analytical methods can be part of experimental research. The purpose of the course is to get acquainted with physical and chemical processes in the mechanisms of fluoride action, analytical methods for determining fluoride and to know the factors influencing the determination of fluoride dose responsible for the beneficial / harmful effects of fluoride; and for those interested, how to master the skill of working with a fluoride ion selective electrode.

Learning outcomes

1. Define the mechanisms of action of fluoride in caries prevention
2. Describe the role of calcium fluoride and fluorapatite on the processes of demineralization and remineralization of teeth
3. Select a fluoride ion selective electrode to determine fluoride in solution
4. Identify the amount of "tightly" and "loosely" bound fluorides after topical application

5. Develop a plan and design for new research on fluoride preparations.

Course contet

Lecture

	Lecture topics	**Number of classes/hours**
1.	Mechanism of action of topically applied fluorides in caries prevention.	1
2.	Fluoride distribution in hard dental tissues. Physical and chemical interactions of fluoride with enamel.	1
3.	Factors influencing the determination of the dose responsible for the beneficial / detrimental effect of fluorine. The role of calcium fluoride and fluorapatite on the processes of demineralization and remineralization of teeth.	1

1 sat = 45 minuta

Seminari

	Seminar topics	**Number of classes/hours**
1.	Analytical methods for the determination of fluoride	1
2.	Ion specific fluoride electrode	1
3.	Relationship between fluorine concentration in preparations for topical application to the formation of alkali-soluble and structurally bound fluorides	1
4.	Influence of frequency of application of topical fluorides on the formation of alkali-soluble and structurally bound fluorides	1
5.	Acidity ratio of fluoride preparations for topical application and formation of alkali-soluble and structurally bound fluorides	1
6.	Influence of calcium availability on the formation of alkali-soluble and structurally bound fluorides	1

1 sat = 45 minuta

Vježbe

	practicals topics	**Number of classes/hours**
1.	Preparation of enamel samples for the determination of non-apatite "loose" and apatite "tightly" bound fluorides	1
2.	Pretreatment, remaating of samples with fluoride solution and preparation of samples for measurement.	1
3.	Preparation of standard solutions and samples for electrochemical (potentiometric) determination of fluoride using ion selective electrodes	1
4.	Measurement of fluorine concentration in ion samples by selective fluoride electrode.	1

5.	Calculation of the amount of calcium fluoride deposited on the enamel ("loosely bound" fluoride)	1
6.	Calculation of the amount of fluoride in enamel ("tightly bound" fluoride)	1

1 class = 45 minutes

Literature

1. Analysis of fluoride concentration in aqueous solutions by use of fluoride ion-selective electrode, ISO 19448:2018 Dentistry.
2. Fejerskov O, Ekstrand J, Burt BA, editors. Fluoride in dentistry. 2. ed., 1. print. Copenhagen: Munksgaard; 1996.
3. Loveren C van, editor. Toothpastes. Basel: S. Krager AG;2013
4. Ullah R, Zafar MS. Oral and dental delivery of fluoride: A review. Fluoride. 2015;48:195.
5. Buzalaf MAR editor. Fluoride and the Oral Environment. Basel; 2011.
6. Rosin-Grget K, Peros K, Sutej I, Basic K. The cariostatic mechanisms of fluoride. Acta Med Acad. 2013;42(2):179-188.

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

Associate Professor at the Department of Pharmacology, School of Dental Medicine, University of Zagreb, Head of the Department. She actively participates in the preparation and holding of classes for students in the courses Pharmacology, Clinical Pharmacology and Toothpaste preparation. She is also the head of the course at the postgraduate doctoral study. She has published, as an author and co-author, several scientific papers in journals indexed in the Current contents database, chapters in books that are university textbooks, and several conference papers and other papers. At the invitation of the editor of the journal, she reviewed papers for journals indexed in the Current contents database and in other databases. She is the leader and collaborator on several scientific projects (completed or still active) funded by the Ministry of Science, Education and Sports, as well as on projects of the Croatian National Science Foundation. She is a member of the Croatian Society of Physiologists, the Croatian Society of Pharmacologists (HDF), the European Pharmacological Association (EPHAR) and the International Pharmacological Association (IUPHAR).

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