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## Poster abstracts:

### COMPARISON OF THE EFFECTIVENESS OF MANUAL AND ELECTRIC TOOTHBRUSHES WITH TWO DIFFERENT ATTACHMENTS IN PLAQUE REMOVAL

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**Aim:** Sonic brushes are widely accepted today, but previous research on their effectiveness in removing plaque shows contradictory results. This study compared the effectiveness of one-time brushing with a hand brush, a sonic brush with a universal attachment and a sonic brush with an attachment for sensitive teeth using a sample of dental students.

**Materials and methods:** Twenty students of the Faculty of Dentistry of the University of Zagreb were included in the research. Each participant received a Curaprox manual toothbrush, model CS 5460, along with a sonic Phillips Sonicare toothbrush with the All-In-One and G3 Premium Gum Care attachments and an Oral B Gum & Enamel Repair toothpaste. The participants were asked not to brush their teeth the night before the measuring, and in the morning the plaque values were measured on buccal and oral surfaces before and after brushing using a randomly selected brush. The Turesky Modified Quigley-Hein Plaque Index visual scale was used to measure the plaque levels. The plaque was stained using a plaque developer with fluorescein and a blue light source. One-way analysis of variance for repeated measurements was used for the statistical analysis of the collected data and the post hoc LSD test applied when necessary. The significance level was set at  $p < 0.05$ .

**Results:** A statistically significant plaque reduction was measured after brushing with each of the three brushing methods, but there was no significant difference between individual methods. Analyzing each jaw separately, it was determined that a higher level of dental plaque was measured on the lower jaw before brushing, and the plaque reduction was statistically significantly higher compared to the upper jaw. The differences in plaque level between the left and right sides of the subjects were not statistically significant. The greatest reduction of soft dental deposits was recorded on the incisors, while the reduction was statistically significantly lesser on the molars. Furthermore, plaque reduction after brushing was statistically significantly higher on buccal surfaces compared to oral surfaces. **Conclusion:** This study did not show a statistically significant difference in plaque reduction after a single use of a manual brush compared to a sonic brush, nor a sensitive electric attachment compared to a standard electric toothbrush attachment.

**Key words:** Dental students, Electric toothbrush, Manual toothbrush, Oral hygiene

### ATTITUDES OF FOURTH-YEAR STUDENTS ON ADDITIONAL METHODS OF CARIES DIAGNOSIS

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**Aim:** Dental caries is a prevalent condition that often affects proximal tooth surfaces. Detection of proximal caries is challenging and requires thorough knowledge, clinical experience, and utilization of different diagnostic methods. This study aimed to evaluate dental students' preferences of caries diagnostic methods for cavitated proximal lesions and their self-reported ability to utilize each method clinically.

**Materials and Methods:** Dental students ( $n=23$ ) in their 4<sup>th</sup> year participated in the study. Each student examined 56 teeth with a clinically suspect primary proximal lesion utilizing five diagnostic methods: visual examination, dental loupes, bitewing radiograph, fiber-optic transillumination (FOTI), and near-infrared transillumination (DIAGNOcam). After the examination, the participants disclosed which method they would use in caries diagnostics and assessed their ability to apply it. Each student was able to select one or more options in a self-reported questionnaire.

**Results:** Additionally, to visual inspection, participants would use bitewing radiography (78%), dental loupes (52%), FOTI (30%) and DIAGNOcam (35%). None of the students regarded exclusively visual inspection as a sufficient method of proximal caries diagnosis. 39% of participants claimed they would easily apply FOTI as a diagnostic method, 35% bitewing radiography, and 30% dental loupes. Only 13% of participants reported they would easily apply DIAGNOcam in clinical practice.

**Conclusion:** Considering the limitations of this study, these results indicate the need for a more common application and practice of various caries diagnostic methods during dental training.

**Keywords:** Bitewing radiography; Dental caries; Dental students; Transillumination

### BOND STRENGTH OF BIOGLASS-BASED ROOT CANAL FILLING MATERIALS

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**Aim:** To test the dentin bond strength of a new material based on polydimethylsiloxane with the addition of bioglass (GuttaFlow bioseal) with dentin, compared to the bond strength of a standard material based on polydimethylsiloxane (GuttaFlow 2).

**Materials and Methods:** 14 single-rooted teeth were used for the test, which were previously chemo-mechanically processed and then divided into two test groups filled with two different materials. After the incubation period, the samples were embedded in the acrylic mixture and as such were ready for cutting with the Isomet saw. They were cut into slices 1 mm thick perpendicular to the longitudinal axis of the teeth, so that an average of 8 slices were obtained from each sample. A digital caliper was used to measure the diameter on each side of the sample. Considering the appearance of the samples, the binding surface was calculated according to the formula for a truncated cone. The "push out" test was used to measure the maximum force applied to the cement before fracturing, and by dividing by the previously calculated area, the bond strength was obtained. The differences in bond strength between the tested groups of filler materials were examined by the non-parametric Mann-Whitney U test.

**Results:** The research results showed that there is no statistically significant difference between the two tested materials. It can be concluded that the binding strength of most samples is between 0 and 1, while higher strengths are the exception rather than the rule.

**Conclusion:** The addition of bioglass to root canal filling materials does not affect their bond with dentin.

This research was conducted within the Croatian Science Foundation project *Structure and bonding surface modification of biomaterials and hard dental tissues*, IP-2022-10-6065.

**Keywords:** Bioglass; Bonding strength; Dentin; Endodontic fillers

### MINIMALLY INVASIVE THERAPY FOR HYPO MINERALIZED ENAMEL USING RESIN INFILTRATION

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**Aim:** The low-viscosity resin infiltration technique is utilized as a minimally invasive treatment for non-cavitated carious lesions and smaller developmental irregularities. The resin has a similar refractive index as healthy enamel. By infiltrating the demineralized pores, this difference can be reduced, and visually healthy surrounding enamel can be mimicked. The aim of this study was to demonstrate the therapeutic and aesthetic effects of resin infiltration.

**Materials and methods:** ICON ((DMG, Chemisch-Pharmazeutische Fabrik GmbH, Hamburg, Germany) was applied to the white non-carious lesions on the vestibular surfaces of central and lateral incisors. After obtaining the patient's medical history and conducting a clinical examination, prophylactic teeth cleaning was performed. The teeth were isolated using light-curing resin in a 3-step procedure: etching, drying, and infiltration. The tooth surface was etched for 2 minutes using 15% HCL acid (Icon-Etch) and then rinsed with water for 30 seconds. After drying with 95% ethanol (Icon-dry) for 30 seconds, it was determined that another round of etching was necessary. The final step involved the application of low-viscosity resin for 3 minutes and light polymerization for 40 seconds. The procedure was completed with the polishing of the teeth surfaces.

**Results:** The white spots have disappeared after the resin infiltration treatment.

**Conclusion:** Using the infiltration technique for demineralized enamel lesions aims to preserve dental tissue with minimally invasive procedures.

**Keywords:** Minimally invasive therapy; Resin infiltration

### RELEASE OF FLUORIDE IONS FROM MATERIALS BASED ON GLASS IONOMER CEMENTS MODIFIED WITH BIOACTIVE GLASS

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**Aim:** The aim of the study was to determine the kinetics of the fluoride ion release from high-viscosity glass ionomer cement, a glass-hybrid material and their modifications with two types of bioactive glass.

**Materials and Methods:** Two commercial materials Fuji IX (GC, Tokyo, Japan) and Equia Forte HT (GC, Tokyo, Japan) were used in the study. The materials were modified by adding 5 wt% Bioglass 4555 (BAG) and experimental fluoride-containing phosphate-enriched bioactive glass (BAG-F). Capsules with the original and modified powder were mixed according to the manufacturer's instructions and 6 groups of 12 samples (5x2 mm) were obtained: 1) Fuji IX, 2) Fuji IX + BAG, 3) Fuji IX + BAG-F, 4) Equia, 5) Equia + BAG, 6) Equia + BAG-F. Measurements of the concentration of released fluoride ions in distilled water were carried out in triplicate with a fluoride-selective electrode after 24 hours, 2, 3, 4, 7, 14, 21 and 90 days after mixing. ANOVA was performed with 8 dependent variables (measurement days).

**Results:** The differences between eight measurements were statistically significant ( $p < 0.05$ ). The differences significantly depended on the material ( $p < 0.05$ ) and

modification ( $p < 0.05$ ). The effect of modification with 5 wt% BAG and BAG-F differed significantly between Fuji IX and Equia ( $p < 0.05$ ). In all eight measurements and for both materials, the release of F was higher in the BAG modification compared to the BAG-F modification, and the unmodified materials released the most F. This effect was more pronounced in Equia: the lowest release of F was recorded in the Equia group, and the highest in the Equia + BAG group.

**Conclusion:** The addition of bioactive glass particles promotes the release of fluoride ions from the Fuji IX SIC and the glass-hybrid material Equia Forte HT.

This research was conducted within the Croatian Science Foundation project *Structure and bonding surface modification of biomaterials and hard dental tissues*, IP-2022-10-6065.

**Keywords:** Bioglass; Fluoride; Glass ionomer cement

### Lecture abstracts:

#### LONG-TERM CLINICAL OBSERVATIONS WITH POSTERIOR GLASS-IONOMERS AND THEIR DERIVATIVES

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In contemporary dental medicine, biomaterials that can remineralize hard dental tissues have been introduced. Biointeractive materials can control tooth decay and biofilm formation due to mineral release and antibacterial properties. Recently, nanomaterials based on fluoride, calcium, phosphate, graphene, metal oxides and peptides have been developed. The purpose of this lecture is to define contemporary biointeractive materials and compare their clinical performance with composite resins based on the available clinical studies.

Key words: biointeractive materials; bioactivity; composite resins; glass-hybrid; glass-ionomer.

#### REINFORCING ROOT CANAL TREATED TEETH WITH SHORT FIBERS – WHEN AND HOW?

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The development of biomimetic dentistry in recent years has changed the way endodontically treated teeth are restored. However, it has become clear that conventional FRC intracanal posts are not entirely satisfactory for this purpose. Increasing numbers of authors justify the need for individualized posts. Short fiber reinforced composites (SFRCs) have gained popularity in restoring deep cavities in the posterior region due to their unique mechanical properties. It seems logical that SFRC can also be used to strengthen root canals. Whether the short fibers alone are sufficient in all clinical situations will be discussed during the lecture.

Keywords: biomimetic behavior; intracanal post; short fiber reinforced composite.

#### DENTAL TREATMENT OF HEAD AND NECK CANCER PATIENTS TREATED WITH RADIATION THERAPY

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Head and neck cancer is a heterogeneous group of diseases that includes cancers of the lip, oral cavity, pharynx, larynx, nasal cavity, paranasal sinuses, salivary glands, head and neck skin. In Slovenia, between 450 and 500 cases are diagnosed annually and are treated with a combination of surgery, radiotherapy and systemic therapy. Radiotherapy is based on ionizing processes in tissues and prevents the growth, division and multiplication of cancer cells. At the same time, healthy tissues near the tumor are destroyed or damaged, including enamel and dentin. This leads to significant acute and chronic complications, including mucositis, dysphagia, hyposalivation, caries after radiation, infections, trismus, neuropathic pain, and osteoradionecrosis. These side effects have a negative effect on the psychosocial well-being and quality of life of patients. The main guideline in the dental care of head and neck cancer patients is to maintain quality of life while preventing or minimizing oral complications.

Keywords: head and neck cancer; osteoradionecrosis; quality of life; radiotherapy.

**SEPARATED INSTRUMENT IN THE ROOT CANAL - WHAT THEN?**Ana Ivanišević<sup>1</sup><sup>1</sup>Department of Endodontics and Restorative Dental Medicine, School of Dental Medicine, University of Zagreb, Croatia

Fracture of endodontic instrument in the root canal during endodontic treatment presents one of the most stressful moments in the professional work of a dentist. There are several factors that determine treatment options and affect the outcome. The factors are related to the

instrument (instrument type, fragment length), separation site (coronary, intermediate or apical third), the anatomy and morphology of the root canal, the degree of root canal infection and the motivation and training of the therapist.

The approach can be conservative or surgical. Conservative approach includes instrumentation and filling to the separated fragment, bypass or removal of the fragment. For the removal of the instrument, it is necessary to visualize the instrument using dental operative microscope, and loosening of the fragment using ultrasonic tips designed for the instrument removal from the root canal. Complications associated with conservative approach are ledge formation, root perforation, fracture of the bypassing instrument or ultrasonic tip, extrusion of the fragment periapically, weakened tooth due to excessive dentin removal and thermal damage to the periodontium. Surgical approach includes apicoectomy, hemisection or amputation of the root, and tooth extraction.

Keywords: Bypassing; Dental operative microscope; Separated endodontic instrument; Ultrasonic activation

**BIOFILM-THE MAIN CAUSE OF RESISTANT APICAL LESIONS**Bernard Janković<sup>1</sup><sup>1</sup>Department of Endodontics and Restorative Dental Medicine, School of Dental Medicine, University of Zagreb, Croatia

Pulpitis and acute exacerbation of chronic periodontitis are some of the most difficult diagnoses in dental medicine. They can be primary (before endodontic therapy) and secondary (as complications after endodontic therapy). Microorganisms in the root canal are resistant to difficult conditions characterized by a lack of nutrients and a wide range of pH and temperature, cohesive growth pattern. They can be resistant to intracanal antiseptics, are able to avoid the body's immune responses, and have the ability to form biofilms and penetrate dentinal tubules. Also important is the synergistic interaction between microorganisms, where they create prerequisites for each other for better growth and development. Particularly important is the aforementioned ability to form a biofilm on the dentine walls of the root canals, which was found in as many as 80% of chronic periapical lesions. In biofilms, microorganisms become much more resistant to external influences, acquire completely different properties than microorganisms of the same species outside the biofilm, there are even mechanisms of mutual communication between microorganisms for the purpose of better adaptation to the conditions inside the root canals (quorum sensing). All the above shows the importance of quality treatment of the intracanal space, in order to remove bacteria and biofilm from the root canals as successfully as possible in order to ensure a successful and predictable outcome of endodontic treatment. In this lecture, we will talk about the causes of persistent periapical inflammation, as well as the procedures that remove the infection from the canal and ensure the healing of periapical lesions.

Keywords: biofilm; disinfection; resistant apical periodontitis

**ODONTOGENIC PAIN- DO WE KNOW EVERYTHING?**Višnja Negovetić Mandić<sup>1</sup><sup>1</sup>Department of Endodontics and Restorative Dental Medicine, School of Dental Medicine, University of Zagreb, Croatia

In certain clinical situations odontogenic pain causes difficulties in identifying a tooth that needs to be treated endodontically. The lecture will explain the most common reasons that lead to problems in diagnostics, describe differential-diagnostic procedures that allow us to make the correct diagnosis and consider clinical cases.

Keywords: odontogenic pain; diagnosis.

**HOSPITAL DENTAL MEDICINE – A TREND OR A NEED**Valentina Brzović Rajčić<sup>1</sup>, Bernard Janković<sup>1</sup><sup>1</sup>Department of Endodontics and Restorative Dental Medicine, School of Dental Medicine, University of Zagreb, Croatia

Dental care of patients in hospital conditions is an increasingly common form of treatment for the most vulnerable groups. A wide range of indications and risks due to possible complications in the treatment of the underlying disease suggest certain deviations from clinical guidelines and diagnostic and therapeutic procedures. Although most often medically conditioned and necessary, hospital dental medicine through a multidisciplinary approach to treatment in day hospitals and procedures under general anesthesia has recently become a trend for all groups of patients.

Keywords: hospital dental care; general anesthesia; vulnerable groups.

**INTERDISCIPLINARY MANAGEMENT OF ROOT RESORPTION / THERAPEUTIC POSSIBILITIES OF ROOT RESORPTION MANAGEMENT THROUGH AN INTERDISCIPLINARY APPROACH**Ivan Puhar<sup>1</sup>, Domagoj Vražić<sup>1</sup><sup>1</sup>Department of Periodontology, School of Dental Medicine, University of Zagreb, Croatia

The occurrence of root resorption, whether internal or external, presents a significant challenge to clinicians. Given that we currently do not have a one-way course of therapy that will enable a long-term successful resolution, the loss of the affected tooth is not uncommon. The lecture will explore today's techniques and approaches that combine the expertise in endodontics and periodontology to effectively deal with these complex cases. In both types of resorption, early detection is crucial to prevent further damage to the teeth and surrounding structures. Regular dental checkups and X-rays can help identify resorption in the early stages. Treatment of root resorption varies depending on the type, extent and underlying cause. Treatment options may include conservative monitoring, endodontic therapy, surgical intervention, or even extraction in more severe cases. The lecture will explore the possible etiology, diagnosis and treatment of different types of root resorption. Through clinical case presentations, interdisciplinary strategies that use the synergy between endodontics and periodontology will be presented. Such cooperation includes endodontic care if clinical situation demands it, flap surgery for a better approach to the working field, applying regenerative materials and long-term monitoring. Case reports that show successful and long-term unsuccessful interdisciplinary interventions will highlight the advantages of a common interdisciplinary approach in preserving tooth structure, periodontal support and general patient well-being. For general practitioners or specialists in endodontics and periodontology, this lecture offers an overview of current knowledge and the opportunity to explore the latest therapeutic options in the management of root resorption through interdisciplinary cooperation.

Key words: endodontic treatment; periodontal surgery; regenerative materials; root resorption.