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## Lecture abstracts

### EVALUATION OF RESTORATIONS AND HOW TO DECIDE ON INTERVENTIONS

Reinhard Hicckel

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In clinical studies as well as in daily practice it is not always easy to judge restorations and to give clear recommendations when to intervene. To improve the existing FDI criteria they were updated by 10 experts (and published in June 2023). Some categories were redefined, ambiguities were cleared, and the descriptions of all scores were harmonized. In this way the different clinical situations can clearly be cross-linked with the four possible management strategies: reviewing/monitoring, refurbishment/reseal, repair, and replacement. In the lecture it will be explained how to handle these updated FDI criteria. Key words: restoration, repair, replacement

### WHY IS THE EASIEST LOOKING RESTORATION SO DIFFICULT? ASPECTS AROUND CLASS V-RESTORATIONS

Thomas Attin

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Thanks to the success of prevention efforts in dentistry prolonged retention of the teeth in the oral cavity is the case in a large part of the population. This has the consequence that the teeth of many people are exposed not only to a possible caries risk, but also to other influences, which may lead to structural dental hard tissue defects. These defects quite often occur at the cervical area of teeth, presenting as non-caries- and caries-related hard tissue loss. In literature, restoration of these lesions come up with very low success rates. This appears strange, since the cavities are mostly located in an easy-to-access location with direct view. The lecture provides backgrounds regarding the etiology of these lesions and will focus on clinical aspects, how to improve the quality and longevity of these easy looking restorations.

Key words: class V-restorations, non-caries, caries-related hard tissue loss

### ECHOSONOGRAPHIC IMAGING IN ENDODONTICS AS A DIGITAL ADJUNCT

Elisabetta Cotti

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Imaging in Endodontics are of great importance for the diagnosis, treatment planning, follow up and overall study of periapical lesions. Besides conventional radiographic techniques, today we have the choice of several advanced systems like Computerized Tomography; Cone Beam Computerized Tomography; Magnetic Resonance and Real Time Echotomography. In the last 20 years' ultrasound real time imaging has been successfully assessed for use in endodontics. The outcomes of the studies have shown that

echographic examination is a valid alternative/complement to traditional radiographic imaging. It allows to visualize periapical lesions within the alveolar bone, to measure all their diameters and to assess their vascular supply. It also enables the operator to make a differential diagnosis between fluid-filled cavities (i.e. cysts) and solid lesions (i.e. granulomas). By studying the vascularization of each lesion, it also appears that it could be followed up in terms of its response to the different phases of endodontic treatment. The exam is biologically safe and definitely applies for one of the standard of future digital diagnostics in apical periodontitis.

Key words: Echosonographic imaging in endodontics

### LARGE LESIONS: DIAGNOSIS AND TREATMENT

Catherine Ricci

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Lesions are the result of the evolution of an Apical Periodontitis and are due to a bacterial proliferation. But when a large periapical lesion is diagnosed on the X-ray, most of the time, the first idea is to ask how to remove it and then who will be able to do it surgically: the practitioner, the oral surgeon or possibly the endodontist. In fact, faced with this situation, the first step is a precise diagnosis to determine the origin of the lesion and ensure that it is a lesion of endodontic origin, in order to avoid treating endodontically vital teeth or performing unnecessary surgery. Different tests will be necessary (vitality tests, CBCT, and clinical examination) and the analysis of the results and their comparison with the patient's perception will allow us to make this diagnosis and to determine our therapeutic choice between an endodontic or surgical treatment or both. Throughout this presentation, our experiment, as a clinician, will allow the participants through many clinical cases, to learn to diagnose and treat large periapical lesions.

Key words: apical periodontitis, diagnosis, treatment

### PSYCHODERMATOLOGY

Mirna Šitum

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Psychodermatologic disorders are conditions involving an interaction between the mind and the skin. Correlation between psychiatric and dermatological disorders is a highly complex relation considering etiology, diagnostic procedures and treatment. There are three major groups of psychodermatological disorders: psychosomatic (psychophysiological) disorders, primary psychiatric disorders and secondary psychiatric disorders. Psychosomatic disorders are dermatological diseases which can be exacerbated or worsened by emotional stress, but are not caused directly by stress. Emotional stress can exacerbate many chronic dermatoses like urticaria, eczema, psoriasis, acne, seborrheic dermatitis, atopic dermatitis, alopecia areata, psychogenic purpura, rosacea, atypical pain syndromes and hyperhidrosis. The treatment of patients with the resistant chronic dermatosis can be difficult when stress is not recognized as a provoking factor. Primary psychiatric disorders are psychiatric conditions which induce development of various skin

changes, e.g. trichotillomania, factitial dermatitis, neurotic excoriations, delusions of parasitosis and dysmorphophobia. They include psychiatric disorders with anxiety, compulsive-obsessive and depressive symptoms and pathologic delusional ideas or hallucinations regarding the skin. Secondary psychiatric disorders appear as a result of a certain disfiguring skin disease that induces psychologic suffering such as loss of self-confidence, anxiety and social phobia. This category includes diseases like psoriasis, chronic eczema, various ichthyosiform syndromes, rhinophyma, multiple neurofibromas, severe acne, and other cosmetically disfiguring cutaneous lesions. The therapeutic approach of psychodermatological disorders should be multidisciplinary including primary care physicians, dermatologist, psychiatrist and psychologist. It is very important to educate dermatologists in the diagnostic procedures and therapy of psychiatric disorders which sometimes coexist with the skin disease. Majority of psychodermatological disorders can be treated with cognitive-behavioral psychotherapy, psychotherapeutic stress-and-anxiety-management techniques and psychotropic drugs. Psychopharmacologic treatment includes anxiolytics, antidepressants, antipsychotics and mood stabilizer.

Key words: psychiatric, dermatological disorders, psychosomatic (psychophysiological) disorders

### PROTEIN DAMAGE AS THE COMMON ROOT CAUSE OF AGING AND DISEASES

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It will be argued that oxidative protein damage is the root cause of aging and all diseases related to aging, which are almost all malignant and degenerative diseases, which together are the cause of about 90% of mortality in most countries. Only 4/10,000 people are centenarians because they do not get diseases related to aging. The lecturer will present arguments for the theory and mechanism of the common cause of aging and all diseases related to aging, and that cause is the corrosion (oxidation) of proteins that together (about 20,000 primary proteins and up to a million variants of chemically modified proteins) perform all life functions. The accumulation of protein corrosion during life means a progressive loss of efficiency and precision of the biological functions of all the cells of our organism. All manifestations of aging and disease are details of the consequences of this progressive loss of biological functions. Organisms that are extremely resistant to radiation and achieve their robustness in time by synthesizing small molecules that protect proteins from oxidation resulting from the attack of oxygen and nitrogen free radicals (ROS and RNS). This protein protection is achieved by the synthesis of antioxidant chemical „chaperones“ that are candidates for the future prevention (or slowing down) of all aging diseases, including aging itself.

Key words: protein damage, aging, diseases

### NAVIGATING THE TREATMENT LANDSCAPE OF PERI-IMPLANTITIS: CONSENSUS, CHALLENGES, AND INNOVATIONS

Håvard J. Haugen

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As the prevalence of dental implants rises, so too does the incidence of peri-implant diseases, including peri-implant mucositis and peri-implantitis. These biofilm-driven conditions are emerging as significant challenges in the field of implant dentistry and periodontology. This lecture aims to address the current state of treatment options for peri-implant diseases, evaluate the consensus among experts in the field, and explore promising new avenues for future protocols, including chemical decontamination strategies for titanium implant surfaces. Data was gleaned from a digital survey involving periodontology, oral surgery, and implant dentistry experts. This lecture will elucidate the findings from novel biomaterials to treat peri-implantitis based on laboratory, microbiology, in vitro, and in vivo experiments. Innovative Approaches: The study scrutinizes the efficacy of chemical decontaminants, particularly NB Clean, an advanced hydrogel formulated with active oxygen. The lecture will also introduce NB<sup>®</sup> Debrillator™, and a specialized instrument made of pure titanium brush designed for the mechanical cleaning of implants. Product Insights: NB<sup>®</sup> Clean hydrogels offer rapid, effective, and safe cleaning with easy application and compatibility with mechanical cleaning methods. NB<sup>®</sup> Debrillator™ complements this by providing a recyclable, single-use mechanical cleaning solution that does not abrade or contaminate the implant surface. Among the chemical decontamination candidates, NuBone Clean demonstrated superior results in surface cleanliness, with safety assessments revealing no adverse events. Furthermore, mechanical cleaning with NB<sup>®</sup> Debrillator™ shows promise in managing implants with complex structures and rough surfaces. Implications: This lecture stimulates professional dialogue for developing standardized treatment protocols and promotes future research into chemical and mechanical decontamination strategies from a clinical and material perspective. This invited lecture at Zagreb University will not only summarize the current state of knowledge. Still, it will also catalyze interdisciplinary collaborations to refine treatment modalities in peri-implant disease management.

Key words: peri-implant diseases, interdisciplinary collaborations

### PROSTHETIC REHABILITATION ON TWO-PIECE ZIRCONIA DENTAL IMPLANTS

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Two-piece zirconia dental implants were considered state-of-the-art in the field of dental implantology and are an alternative to traditional titanium dental implants. Zirconia as a ceramic material is known for its biocompatibility and natural appearance, making it an attractive option for metal dental implants. The osseointegration and soft tissue integration of the zirconia implants are not different between titanium implants, therefore are suitable for long-term use in the oral cavity. The smooth polished zirconia ceramic surface of the bone part of the implants and the surface of prosthetic components tends to accumulate less plaque compared to titanium implant surface and therefore enable maintain good oral hygiene. Two-piece zirconia dental implants consist of the bone implant and screwed abutment, which allows better customization and flexibility of the prosthetic part of the restoration. The first generation of two-piece zirconia implants finished at the gingival level, where the prosthetic superstructure continued (tissue level/TL). Recent two-piece zirconia dental implants have been developed, with the prosthetic base at the bone level similar to bone level titanium implants (bone level/BL). Preliminary results of a randomized controlled clinical trial evaluated the clinical outcomes of two-piece zirconia implants in the maxillary premolar region with platform at soft tissue or bone level one year after placement. All of all-ceramic single-tooth restorations presented successful integration with stable soft tissue around both types of the implants restored with all ceramic crowns.

Key words: two-piece zirconia dental implants, all-ceramic single-tooth restorations

### ORAL REHABILITATION FROM ANALOG TO DIGITAL

Marko Jakovac

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Fixed prosthodontics is in a period of adaptation and digitization, which will change the profession in the next ten years. The digital method of producing indirect restorations provides faster and repeatable solutions, and the precision of making restorations is already superior in some parts to manual restorations. In order to facilitate the progress from analog to digital prosthodontics, a standard and simple workflow of work phases is needed. Work planning is becoming more and more simple and a complete implementation of planning is required in every prosthetic work. Good planning makes the transition of work from experiential to controlled and predictable. After that, all phases of fixed-prosthetic therapy become simpler, tooth grinding can be guided, scanning impressions simpler, and finishing with cementation easier. The lecture will present several cases of oral rehabilitation and a comparison of analog planning with digital.

Key words: analog, digital, fixed-prosthetic therapy

### THE IMPORTANCE OF DENTISTRY IN HUMAN IDENTIFICATION: FORENSIC ODONTOLOGY

Cristiana Palmela Pereira

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Forensic Odontology involves the processing, review, evaluation and presentation of dental evidence with the purpose of contributing scientific and objective data in legal processes. Since the dental records obtained from the dentists can identify an individual, they are extremely important for Forensic Odontology. Dental identification can have three different applications: (a) Comparative identification, in which the postmortem dental records are compared with the antemortem records of an individual in order to establish whether both records correspond to the same person. (b) The obtainment of dental information to narrow the search for an individual when the antemortem records are not available and there are no possible data referred to the identity of the subject. (c) Identification of victims following mass disasters or catastrophes. The comparative dental analyses figure as primary means for human identification. In practice, primary means are considered scientifically reliable and stand-alone tools – that do not necessarily require combination with other methods, such as friction ridge and genetic analyses. In the comparative dental analysis, antemortem (AM; living) data obtained from dental records (presence of dental fillings, endodontic treatments, crowns or bridges, radiological studies to verify the clinical findings, the presence of malocclusions or dental fractures, etc.) are compared with postmortem (PM; cadaver) data obtained from the dental autopsy to determine whether both records correspond to the same individual. Dentists are responsible for keeping the dental records update from their patients. This is the fastest way to identify a cadaver based on the dental records from living person. This conference will highlight the need for good dental records in order to ensure a fast processing in reconciliation of human identification while mitigating risk.

Keywords: Forensic Odontology; Primary Method; Human Identification; Clinical Dental Records.

## DETERMINATION OF DENTAL AGE FOR THE PURPOSE OF IDENTIFICATION OF LIVING PEOPLE AND CORPSES

Hrvoje Brkić

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Determining dental age is now used for clinical purposes to determine whether teeth are sufficiently developed and mature for eventual treatment in endodontics or orthodontics. Furthermore, the determination of dental age is extremely important in forensic and archaeological research to determine how old a person was at the time of death. In recent years, the need for age assessment has escalated with the increase in the number of migrants and asylum seekers. Variables related to dental age provide information based on changes in tooth morphology in adults and occur during tooth development in children and adolescents. This can be observed macroscopically on tooth surfaces either clinically, or even better by radiological analysis. Determination of dental age can be carried out during childhood, adolescence and in adults. Based on numerous published scientific studies, the best statistical significance of dental age was obtained in children, slightly less in teenagers, and determining age in adults is quite demanding. Atlas techniques and dental maturation are useful for determining age since they are more highly correlated with age than bone and somatic growth. Biological changes during aging are continuous processes, so these changes are difficult to quantify and measure, but possible. Age estimation based on changes in dental tissues (attrition, dentin translucency, cementum deposition and secondary dentin) will give biological age which in many cases is related to chronological age. This research was funded by the Croatian Science Foundation, project number IP-2020-02-9423, Tooth Analysis in Forensic and Archaeological Research.

Key words: age estimation, forensic dentistry, identification

## ARTIFICIAL INTELLIGENCE IN DENTISTRY

Marin Vodanović

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Artificial intelligence has been used for several decades; however, its integration into everyday life is recent. The first application of artificial intelligence was primarily in academic and government research institutions. Still, with the advancement of technology, it began to be used in industry, commerce, medicine and dentistry. Considering the accelerated development and expansion of the possibilities of applying artificial intelligence, this lecture aims to give an overview and insight into the possibilities of using artificial intelligence in medicine and dentistry, with particular emphasis on its advantages and disadvantages. The possibilities of applying artificial intelligence in medicine and dentistry are just being discovered. Artificial intelligence represents a significant part of the future development of medicine and dentistry, given that it is a tool that ensures growth and progress, especially in individualized healthcare, and promises significantly improved treatment outcomes.

Key words: artificial intelligence, dentistry, forensic dentistry

## BURNING MOUTH SYNDROME - A RELEVANT DISCOVERY LEADING TO AN EASY DIAGNOSIS AND EFFECTIVE REDUCTION OF SYMPTOMS

Ivan Alajbeg

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This frequent condition, almost equally frustrating for patients and clinicians, is complicated by numerous misconceptions that distract us from a rational approach. The definition of burning mouth syndrome (BMS) postulates that the diagnosis is very complicated and only by excluding other pathological conditions. However, complex approaches to diagnosis and treatment of patients with chronic burning sensation on healthy oral mucosa have not brought us closer to successful treatment. Almost all published treatment interventions have shown some effect and „work in some patients”, but they have never been shown to be truly superior to placebo. Placebo also „works well”, a fact that gives us an interesting insight into the background of the „real” success of today's accepted treatment modalities. The lecture describes research on the effect of one special property of BMS, that symptoms decrease during meals. This property has been mentioned in the literature, but has never received the attention it deserves. It is not universally accepted, nor is it included in any of the existing definitions of BMS. Most clinicians would encounter it among patients, but there is no assessment of the consistency of this property in the BMS population. The lecture offers a rational approach to the treatment of patients with BMS and offers a realistic set of protocols for its quick and simple diagnosis and for the best available treatment.

Key words: burning mouth syndrome, diagnosis, reduction of symptoms

## ADVANTAGES AND DISADVANTAGES OF DENTAL RESTORATION UNDER GENERAL ANESTHESIA

Bernard Janković

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Dental procedures under general anesthesia represent a new direction in clinical practice that is becoming more and more prevalent, especially in some groups of patients (Sy Down, cerebral palsy, autism, etc.) where this is the only form of restoration of pathological changes in the teeth. It is also the therapy of choice for patients with a pronounced urge to vomit, as well as for patients with a pronounced fear of the procedure. The specificity of these procedures is that they require hospital treatment, special devices and an educated team that includes, in addition to dentists, assistants and instrument technicians, an anesthesiology team. In this lecture, the possibilities of rehabilitation under general anesthesia will be described, as well as the previous experiences in the work of the teams for Hospital dental medicine at CHC Rebro.

Key words: advantages/disadvantages, dental restoration, general anesthesia

## TECHNIQUES OF ROOT CANAL INSTRUMENTATION DEPENDING ON THE ANATOMY OF THE ENDODONTIC SPACE

Silvana Jukić Krmek

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Anatomical factors, in addition to the material and design of the instrument and the skill of the therapist, are key to the outcome of mechanical root canal treatment. The complexity of the internal anatomy of the tooth is more the rule than the exception. One of the most common anatomical features is the curvature of root canals, and the instrumentation of such canals is demanding and involves the use of certain techniques and a combination of manual and engine-driven instruments. In the lecture, different instrumentation techniques will be presented depending on the degree and type of canal curvature, with an explanation of the role of design and type of alloy in canal instrumentation.

Key words: techniques, root canal, instrumentation, anatomy

## RESTORATIVE PROTOCOL FOR PROSTHETIC REHABILITATION

Vlatko Pandurić

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The therapist must know other branches of dental medicine in order to get the best possible preparation for making prosthetic work. In order for the success of the therapy to be predictable, safe and reproducible, it is necessary to establish a protocol, that is, the stages of the therapy to be followed. No matter how much improvisation is a characteristic of a good dentist, it must not be present in the phases of the protocol but within each phase separately. Every prosthetic therapy is preceded by restorative pretreatment. What needs to be repaired? Will the rehabilitation be direct? Should the tooth be devitalized? Should a healed tooth be endodontically treated again? These are all questions that arise in the pre-prosthetic preparation of the patient. This lecture should offer an answer to those questions.

Key words: restorative protocol, prosthetic rehabilitation

## WHITENING OF VITAL TEETH - POSSIBILITIES AND LIMITATIONS

Eva Klarić

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For more than a century, whitening has been used to achieve a lighter color of natural teeth. The performance of the procedure itself, as well as the chemistry of the reactions that take place during it, have been well researched and scientifically supported and contribute to the safety of the procedure itself. They can result in a permanent effect, but most often the stability of the tooth color after the whitening procedure is limited in time. The most commonly used whitening procedures for vital teeth are: whitening in the office and whitening at home. The first procedure uses high concentrations of whitening agents that are applied to the teeth after protecting the soft tissues. For whitening at home, low concentrations of bleaching agents are used, and they are inserted into individually prepared splints. The purpose of this lecture is to introduce doctors of dental medicine to modern whitening techniques and procedures, the correct selection of candidates for whitening, indications and contraindications for teeth whitening, and the most common mistakes and doubts that we encounter before, during and after the teeth whitening procedure itself.

Key words: whitening, vital teeth, possibilities, limitations

## ZIRCONIA CERAMICS IN CONTEMPORARY REMOVABLE PROSTHODONTICS

Peter Jevnikar

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Yttria-partially-stabilized tetragonal zirconia polycrystalline ceramic (Y-TZP) represents an important prosthodontic therapy option in aesthetically pleasing, all ceramic dental restorations. Its main advantages are chemical inertness, bio-compatibility and exceptionally high strength and fracture toughness. The last of these are attributable to its ability to undergo a martensitic phase transformation (t-m) of the thermodynamically metastable tetragonal grains into the stable monoclinic form as a result of mechanical stress, thereby developing transformation toughening. In the past decade there have been major advances in the application of yttria partially stabilized zirconia (Y-TZP) ceramics for dental restorations. Zirconia frameworks are produced mainly by CAD-CAM machining followed by sintering. This way fixed partial dentures are commonly produced and there is large evidence of clinical success of such restorations. In removable prosthodontics, however, Y-TZP ceramics has become a material of choice only after the development of the high strength ceramic materials. Y-TZP ceramics are used for the extracoronal attachments and milled bars. A double crown technique has also been introduced, that uses this strong material. In a classic double crown technique both, primary and secondary crown are cast from semiprecious or precious alloy. Retention of the system is primarily based on the friction between the vertical walls and occlusal wedging. In the new clinical protocol introduced by Weigl et al., primary conical crowns are milled from Y-TZP ceramics and secondary conical crowns galvanoformed in gold. Galvanic technology has increasingly been used in removable prosthodontics. For the manufacturing of secondary conical crowns and secondary bar structures, due to the precise fit provided by direct gold deposition on the secondary structure. Electroformed prosthetic restorations are also biocompatible since they are made of elemental gold. Allergic reactions to various dental materials are commonly reported, hence the use of galvanic technology in a contemporary prosthetic rehabilitation is particularly indicated. Retention mechanism is of the Y-TZP-galvano system is based primarily on the very precise manufacturing of both crowns. The template for the galvanofarming of the secondary crown is primary ceramic crown itself. Consequently a gap not exceeding 5 microns can be achieved. Retention of the system is therefore primary based on capillary pressure and adhesion between the crowns. This way predictable and long-term stable clinical success can be achieved. Retention of the system also depends on the conical crowns surface area, surface roughness of the materials and coefficient of friction. The proposed protocol includes intraoral bonding of the secondary galvano crowns to the tertiary metal framework. Indications for the Y-TZP-galvano system will be discussed and various clinical cases presented.

Key words: zirconia ceramics, removable prosthodontics

## THE USE OF THE DIGITAL FACE BOW IN EVERYDAY PROSTHETIC THERAPY

Nikša Dulčić

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Prosthetic therapy represents the most common, and often the most important, form of oral rehabilitation of patients because it establishes the final aesthetic, phonetic and chewing function of the patient. When conducting prosthetic therapy, the most important thing is to make a correct therapy plan by respecting the biological properties of individual tissues of the masticatory system, and to adhere to the time course and the given sequence of clinical and laboratory procedures. In clinical everyday life, there are a number of analog and digital procedures, different materials, mechanical, digital instruments and software tools available, which sometimes creates doubts in their application. In this lecture, the procedures for using the digital face bow in the production of prosthetic works in daily clinical work in the dental office and dental laboratory will be presented.

Key words: digital face bow, prosthetic therapy

## DENTAL MATERIALS IN THE DIGITAL IMPLANT THERAPY WORKFLOW

Joško Viskić

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Dental materials are developing daily due to the progress of digital technologies. Changes in the methods of industrial production, laboratory production and in-office protocols have led to a massive cacophony in the daily work with dental materials in practice. Can we see a tree from the forest? Zirconium oxide is a material that dominates everyday work, but it also presents several challenges that can lead to complications and failures in clinical work. Due to the constant evolution of the composition and method of production, it is necessary to be well acquainted with all the latest knowledge to be able to correctly choose the best material for a particular type of dental implant therapy in clinical work. Also, it is important to know the limitations of zirconium oxide and alternative materials

and production processes to be able to make the right decision in every clinical situation. The aim of this lecture is to present the most critical changes in the understanding and application of modern materials in the digital process of manufacturing implant prosthetic restorations. The planning and implant placement, impression and fixation protocols that follow after material selection can differ significantly from analogue dentistry. When milling is the optimal choice, and when 3D printing, whether monolithic restorations are more durable and whether layered restorations are always more aesthetically acceptable will be discussed in this lecture. Also, through clinically applicable examples, dental materials' chemical and mechanical properties will be explained for the digital process of making implant prosthetic restorations, and clear guidelines for everyday work will be given. Key words: dental materials, implant, digital therapy workflow

## THE EMPLOYMENT OF AUTOLOGOUS DENTIN GRAFT IN ORAL, MAXILLOFACIAL SURGERY & IMPLANTOLOGY

Yan Vares

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In the workshop under the name „The Employment of Autologous Dentin Graft in Oral, Maxillofacial Surgery & Implantology” the participants will learn about the historical aspects, theoretical aspects and the modern evidence-based approaches of autologous dentin graft use. The lecture will show autologous dentin graft application in cases of alveolar ridge preservation, wisdom teeth removal, cyst removal, trauma surgery, 2-stage implantation procedures and 1-stage implantation & immediate loading procedures.

Key words: autologous dentin graft, oral surgery, maxillofacial surgery, implantology

## CARIOGENIC MICROBIOME OF SUPRAGINGIVAL DENTAL BIOFILM IN CIGARETTE SMOKERS AND NON-SMOKERS

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The aim of the present cross-sectional study was to assess the presence of cariogenic bacteria in the microbiomes of supragingival dental biofilms cigarette smokers and non-smokers. 40 subjects participated in the present study and were divided in 2 groups: cigarette smokers and non-smokers. The examined groups were age and gender matched. Samples of supragingival dental biofilm were collected from each subject with sterile curesets and stored at -20 °C. From each sample bacterial DNA was isolated and prepared for 16s rRNA metagenomics through next generation sequencing (NGS). From the collected samples a total of 251 bacterial species was detected. To determine which of the isolated species are cariogenic recent scientific literature was consulted. Out of all the isolated bacterial species, 12 were considered as cariogenic: Actinomyces naeslundii, Bifidobacter dentium, Granulicatella elegans, Prevotella denticola, Prevotella pallens, Scardovia wiggsiae, Slackia exigua, Streptococcus mutans, Streptococcus parasanguis, Streptococcus sobrinus, Veillonella denticariosi, and Veillonella parvula. Data distribution was tested through the Kolmogorov-Smirnov test. Statistical analysis was done with set significance value of p<0.05 through the  $\chi^2$  test and One way ANOVA. There were no significant differences in the presence of the mentioned cariogenic bacteria between cigarette smokers and non-smokers. The two examined groups did not differ in the present number of different cariogenic species. Cigarette smokers and non-smokers have similar content of cariogenic bacteria in the supragingival dental biofilm.

Key words: dental caries, microbiota, smoking, smoking devices

## THE INFLUENCE OF IONIZING RADIATION ON THE RELEASE OF FLUORIDE FROM DENTAL MATERIALS

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To examine the effect of ionizing radiation for head and neck radiotherapy procedure on the release of fluoride from dental materials. Glass ionomer and composite resin materials known for their fluoride release were used in this study. Samples of Equia, Fuji Triage, Fuji IX, Cention, Activa Presto, Beautifil and Luminos (n=10) were made in teflon molds (4x4 mm) and divided into a control and experimental group. Experimental group was exposed to ionizing radiation for a total of 35 days and received a dose of 70 Gy, 2 Gy per day. Fluoride release was measured with a fluoride-selective electrode on the first 10 days, 21. and 35. day. Fluoride values were logarithmized and ANOVA was used for analysis. The median recorded fluoride values were higher with Equia, Fuji Triage and Fuji IX compared to others during the entire period of the research in both groups. With Activa

Presto, a higher release of fluoride was recorded in the experimental group on the first day of irradiation ( $p < 0.001$ ), on the other days, a higher release was recorded in the control group, as well as with Luminos and Beautifil. With Centon, there is no statistically significant difference in fluoride release between the experimental and control groups except on the 6th day. With Fuji Triage and Fuji IX, the release of fluoride is higher in the experimental group compared to the control group, while with Equia there is no difference between the groups. In conclusion, ionizing radiation has no effect on fluoride release in Centon and Equia while in Fuji Triage and Fuji IX we find a significant difference and higher release in the experimental group. With Activa Presto, Luminos and Beautifil we find no significant difference between the groups.

Key words: ionizing radiation, dental materials, fluoride release

### EFFECT OF SILANE-CONTAINING ADHESIVES ON REPAIR BOND STRENGTH BETWEEN COMPOSITES

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Current recommendations for minimally invasive dentistry favour the repair rather than replacement of defective restorations. However, there are no clear guidelines for the use of silane-containing adhesives. The aim was to investigate the effects of different surface treatments and silane-containing adhesive on the repair bond strength between fresh or aged resin composites. 140 composite specimens (Filtek Supreme Ultra A2B, d=5mm, h=2mm) were prepared and aged for: 1) 24h or 2) 4 months (4mth). Each group was subdivided into seven subgroups (n=10): 1) no surface treatment (NT), 2) Al<sub>2</sub>O<sub>3</sub> sandblasting (SAND), 3) SAND + Prime&Bond (SAND+P&B), 4) SAND + Scotchbond Universal Plus (SAND+SBU), 5) Sof-Lex coarse red disc (DISC), 6) DISC + Prime&Bond (DISC+P&B), 7) DISC + Scotchbond Universal Plus (DISC+SBU). Filtek Supreme Ultra was used for the repair (d=3.15mm, h=2+2mm). Specimens were dark stored in distilled water at 37°C for 28 days. Shear bond strength was tested by loading specimens at a constant crosshead speed of 0.5 mm/min. Bond strength values were compared among treatments using the Kruskal-Wallis test for independent samples with Bonferroni post-hoc adjustment ( $\alpha=0.05$ ) and Mann-Whitney U-test for comparisons between 24h and 4mth. The results are shown as median and Q1-Q3 interquartile range. The highest bond strength had 24h\_DISC+P&B (20.39(16.85-28.83)). 24h\_SAND+P&B (12.25(8.28-15.05)) and 24h\_DISC+SBU (18.37(15.16-21.29)) had statistically similar values within 24h. The treatments with both adhesives in 4mth was statistically similar and lower than 24h, except for SAND+SBU. The treatments without adhesive application had the lowest values, with no significant differences between them. The present study shows that the silane-containing adhesive SBU was not superior to an adhesive without the silane (P&B) in the repair of fresh or aged composite. For a successful repair of composite fillings, surface treatment with sandblasting or surface roughening in combination with adhesive is recommended.

Key words: shear bond strength; composite repair; aging; silane; adhesives

### PRACTICES REGARDING ANALGESICS IN DENTAL CARE

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The objective of this study was to examine the understanding and prescription trends of analgesics among Croatian dentists. A cross-sectional online questionnaire garnered 379 responses. Among the respondents, 74.9% were women, and 68.6% identified themselves as general dentists. The questionnaire covered sociodemographic information, assessed knowledge levels, and explored prescription patterns concerning analgesic use. The data were analyzed using descriptive statistics and regression analysis. Endodontics and oral surgery specialists, as well as dentists who devote more than 6 hours per day to patient care, exhibited statistically significant higher levels of knowledge and confidence in prescribing analgesics. Among respondents, over 90% recognized the statement „Long-term use of opioids can lead to addiction,” while only 29.6% were aware of the statement „In most cases, NSAID analgesics are more effective than opioids in the treatment of odontogenic pain”. Dentists displayed the highest confidence levels in dosing and administering analgesics, but their confidence was notably lower when prescribing for patients with gastrointestinal, nephrological, endocrine/metabolic, and respiratory conditions, as well as concerning drug and food interactions. Most respondents commonly prescribe ibuprofen (97.9%) and paracetamol (51.5%). The study found gaps in dentists' knowledge and confidence in prescribing analgesics, indicating a need for focused education to enhance prescription practices and pain management.

Key words: analgesics, dentists, dentistry, knowledge, prescription

### ASSESSING DENTAL ANXIETY AND FEAR IN CROATIAN ADULTS

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This cross-sectional study aimed to assess the levels of dental anxiety and phobia and their correlation with self-reported oral health status and sociodemographic factors among the adult population in the Croatia. The study utilized an online self-administered questionnaire with 1551 participants, covering demographic characteristics, self-reported oral health status, and Gatchel's 10-point dental fear scale (FS), alongside the Modified Dental Anxiety Scale (MDAS). Analysis involved descriptive statistics and regression analysis. Among all respondents, the average score for MDAS was  $9.70 \pm 5.11$  (minimum 5, maximum 25), with 9.7% being extremely anxious and 26.6% moderately anxious. On the fear scale (1-10), the average score for all participants was  $3.83 \pm 2.91$  (minimum 1, maximum 10). Of these, 26.7% were assigned to the group with no dental fear, 17.3% to the group with high dental fear and 16.2% to the group with moderate fear. The majority (58.7%) described oral surgery procedures as the most unpleasant with the highest prevalence of anxiety, while one-fifth of participants (20.0%) had no anxiety about any dental procedure. In addition, 45.8% of participants reported being afraid of dental procedures in the past but not in the present, and 36.2% associated personal negative events with fear of dentists and dental procedures. The study underscores the prevalence of dental anxiety among respondents, with significant proportions experiencing moderate to high levels of anxiety, particularly towards oral surgery procedures, presenting a challenge to dental personnel in effectively addressing and managing patient fears during dental care.

Key words: adults, dental anxiety, dental fear, Modified Dental Anxiety Scale, prevalence

### INFLUENCE OF DIFFERENT MEDIA ON DEGRADATION OF THE ALKASITE MATERIAL

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To investigate how artificial aging in different media affects the degradation of Centon Forte (Ivoclar) and to compare the influence of different curing protocols on flexural strength. Bar-shaped specimens (16x2x2 mm) were prepared, according to NIST 4877, using custom-made Teflon molds. Three light-curing protocols were performed: 1) light-cured (20 s), 2) self-cured and 3) light-cured (20 s) with a delay of 5 minutes. Each curing protocol was divided into four arms according to the aging regimes in different media: 1) lactic acid (pH=4), 2) NaOH solution (pH=13), 3) ethanol (75%) and 4) phosphate-buffered saline (pH=7.4). For each of the 12 experimental groups (3 curing protocols x 4 immersion media), 20 specimens were made. After a two-week immersion, flexural strength was tested. Statistical analysis was performed using a two-way ANOVA with Tukey post-hoc adjustment ( $\alpha=0.05$ ). Flexural strength differed significantly between self-cured (68.88-108.27 MPa) and light-cured specimens regardless of delay (103.31-140.39 MPa). All light-cured specimens achieved the minimum acceptable flexural strength (80 MPa), according to ISO 4049 protocol. The highest flexural strength was noted in the neutral medium (108.27-140.39 MPa). A statistically significant decrease in comparison to the neutral medium was observed in acid (110.53-129.77 MPa) and alkaline (88.03-112.24 MPa) media. The lowest flexural strength was measured in ethanol (68.82-111.92 MPa). Centon Forte underwent aging-induced degradation, with the following ranking of immersion media: ethanol > alkaline > acid > neutral medium. Centon Forte should be light-cured whenever possible due to significantly better flexural strength.

Key words: Centon Forte, degradation, flexural strength, artificial aging

### POST-CURE DEVELOPMENT OF THE DEGREE OF CONVERSION OF RESIN-BASED ORTHODONTIC ADHESIVE SYSTEMS WITH A HIGH FILLER LOAD

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This study aimed to determine the short- and long-term post-cure development of the degree of conversion (DC) as a function of bracket material of resin-based orthodontic adhesive systems with a high filler load. Two orthodontic adhesive systems with 70-80 wt% of filler load were tested: Enlight (Ormco) and Transbond XT (3M). The samples were prepared for short-term (n=6) and long-term (n=8) measurements. Materials were tested in three groups: without a bracket (control group, CO), with an overlying metal bracket

(MB), and with an overlying ceramic bracket (CB). Samples were light-cured using a LED curing unit with a continuous radiant exitance of 1000 mW/cm<sup>2</sup> (Bluphase G2, Ivoclar Vivadent) for 20 s positioned directly above material or CB, and 10 s mesially and 10 s distally for samples with MB. DC was determined using Fourier-transform infrared spectroscopy (FTIR) with attenuated total reflectance (ATR). Real-time measurements were performed to determine short-term DC in 2, 6, and 10 minutes, and long-term measurements were performed 1, 7, and 28 days after light-curing. Statistical analysis was performed using one-way ANOVA with Tukey post-hoc correction at an overall significance level of 0.05. Short-term DC values ranged from 43.9% (Enlight2min, MB) - 64.5% (Enlight10min, CO) and long-term DC values ranged from 72.6% (Transbond XT1d, MB) - 85.3% (Enlight28d, CO). A substantial rise up to 32.9% in the DC values was observed 1 day after light-curing compared to values obtained 10 minutes after light-curing for both tested materials in all groups with the largest difference in the MB group (CO:18.2% - 20.3%; MB:19.2% - 32.9%; CB:19.2% - 19.8%). Resin-based orthodontic adhesive systems with a high filler load demonstrated extended polymerization resulting in a substantial DC rise within 24h following light-curing. Orthodontic bracket material had less effect on the long-term than short-term DC values.

Key words: post-cure polymerization, degree of conversion, orthodontic adhesive systems, FTIR, orthodontic brackets

### TIME STABILITY OF FLUORIDE CONTAINING SAMPLES- PILOT STUDY

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This study aimed to evaluate the stability of fluoride-containing samples over time with measurements taken immediately, after one day, and after one year, alongside verifying labeled free ions in various pharmaceutical solutions. Fluoride was extracted from 30 enamel slabs using 1M KOH solution for 24h and under agitation of the shaker at the room temperature, by method of Caslawka. The extracts were analyzed using fluoride ion-specific electrode (Orion Research EA 940) by ISO 19448:2018 standard method, in triplicates, at the same day of extraction (n=30), one day later (n=10) and one year later (n=20), after storage in firmly closed polystyrene cups on room temperature. Free fluoride ion concentration was determined using the same electrode, for 9 different pharmaceutical solutions (sodium fluoride 70, 100, 226ppm F<sup>-</sup>; monofluorophosphate 30, 65, 226ppm F<sup>-</sup>; amine fluoride 35, 75, 226ppm F<sup>-</sup>) to check labeled free ions. Statistics: Coefficient of variation (CV) was used to analyze the effect of time on precision of measurements, and simple ratio of measured and labeled fluoride concentration. On the day of extraction, 6 out of 10 samples exhibited CV<10%, and 8 samples had CV<20%. After one day, 5 samples had CV<10%, and 7 had CV<20%. After one year (n=20), CV results remained consistent with those at the beginning, with 12 samples exhibiting CV<10% and 18 samples with CV<20%. The ratio of measured to labeled fluoride concentration for NaF ranged from 0.9 to 1.3, for AF from 0.09 to 0.18, and for MF from 0.04 to 0.06. Fluoride-containing samples retained stability even after one year of storage in tightly sealed polystyrene cups at room temperature. Further assessments are needed to be included in the process to assess stability for measurements taken after a one-day delay. Special conditions are required for the ratio of measured and labeled fluoride concentration for AF and MF pharmaceutical solutions.

Key words: sodium fluoride, monofluorophosphate, amine fluoride, sample stability

### SUSTAINED RELEASE OF CALCIUM IONS FROM A MODEL COMPOSITE MATERIAL DOPED WITH AN EXPERIMENTAL BIOACTIVE GLASS

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To investigate the sustainability of calcium ion release from a model composite with an experimental bioactive glass. A model resin composite was prepared based on a photo-curable Bis-GMA/TEGDMA resin matrix (60:40 by weight) with a high ratio of an experimental bioactive glass (40 wt%). The remainder of the fillers consisted of silanized barium glass and silica, up to a total filler load of 70 wt%. The negative control material contained only barium glass and silica fillers. The composite samples (d = 6 mm, h = 2 mm) were light-cured (1000 mW/cm<sup>2</sup> for 20 s) and immersed in 5 mL lactic acid solution (pH = 4.0). Every four days, the calcium concentration was determined spectrophotometrically using the Arsenazo III method. A dual-beam UV-Vis spectrophotometer (Genesys 180, Thermo Fisher Scientific, Waltham, MA, USA) was used to measure absorbance at 650 nm, from which calcium concentrations were calculated. Statistical analysis was

performed using one-way ANOVA with Tukey post-hoc adjustment. Cumulative calcium concentrations (mg/mL) were (mean ± standard deviation): 6.9 ± 1.5 (4 days), 14.5 ± 2.3 (8 days), 20.3 ± 3.2 (11 days), 29.1 ± 4.7 (15 days), and 35.6 ± 4.4 (18 days). No statistically significant decrease was observed across the time points (p > 0.05). The plot of cumulative calcium concentrations over time indicated a sustained almost linear increase. The calcium concentrations released from the negative control material were 140-700 times lower than those released from the model composite material. They ranged between 0.05-0.07 mg/mL and were significantly lower compared to the model composite material at all time points. The model composite material with a high amount (40 wt%) of an experimental bioactive glass showed sustained calcium ion release over the 18-day measurement period, in contrast to previous iterations of similar experimental composites, which showed significantly reduced calcium release after 8 days.

Key words: calcium ions, composite, bioactive glass, spectrophotometry

### IDENTIFYING RISK FACTORS FOR DENTAL FEAR AND ANXIETY IN CHILDREN WITH TRAUMATIC DENTAL INJURIES

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Early childhood experiences of traumatic dental injuries (TDIs) can significantly elevate the risk of children developing dental fear and anxiety (DFA). This study aims to pinpoint the risk factors contributing to DFA in such cases. We engaged 220 pairs of parents/caregivers and their children who had encountered TDIs, examining their socio-demographic data through a tailored WHO Oral Health Questionnaire for Children. This included inquiries on parental knowledge and attitudes towards dental health, while assessing DFA levels via the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS). Oral hygiene was evaluated using the Simplified Oral Hygiene Index (OHI-S). The study identifies parental knowledge, the child's female gender, oral hygiene quality, and recent pain experiences as confirmed DFA risk factors. Contrarily, the child's age, specific TDI types, soft-tissue injury presence, and subjective complaint volume did not significantly impact DFA. The model effectively predicted DFA variance by 54%, with a significant statistical outcome (R<sup>2</sup> = 0.545, F(4.215) = 64.28, p<0.001). Highlighting the critical role of pain management, oral hygiene maintenance, and enhanced parental knowledge, our findings suggest targeted interventions to reduce DFA among children suffering from TDIs.

Key words: dental fear and anxiety, parents, children, dental trauma, oral hygiene

### AVULSION RISK ANALYSIS IN THE PEDIATRIC POPULATION OF ZAGREB, CROATIA

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In this study, risk factors of tooth avulsion were evaluated in the pediatric population of Zagreb, Croatia. This retrospective study was carried out at the Department of Pediatric Dentistry, School of Dental Medicine, University of Zagreb. A total of 52 avulsion cases in patients aged 0-18 over an 8-year period were collected and analyzed. Variables observed from the dental charts were patient age, gender, soft tissue injuries, number of traumatized teeth, time of arrival, and cause of injury. The patients place of residence was also noted, due to the possible distance to the clinic. Logistic regression was analyzed to assess risk factors for tooth avulsion. Most avulsion patients arrived in the first 24 hours from the injury (66.1%), more importantly, 60% of those arrived within the crucial 2-hour period. However, 18.5% sought treatment one month after the traumatic incident. Soft tissue injuries heighten the risk of avulsion 5.5 times. Statistically relevant risk factors for tooth avulsion presenting in the university clinic in Zagreb, Croatia were arrival time and the inclusion of soft tissue injury. Tooth avulsion requires urgent dental treatment, with time of arrival being crucial for the most favorable prognosis.

Key words: avulsion, dental trauma, pediatric dentistry, prevention

### ACCURACY OF TOOTH SIZE MEASUREMENTS BETWEEN PLASTER MODELS AND DIGITIZED MODELS

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Traditional orthodontic models, obtained through conventional methods, have long been relied upon for diagnosis, treatment planning, and assessing treatment outcomes. However, the emergence of three-dimensional (3D) digital models presents new

opportunities in orthodontic treatment. The aim of this research was to assess deviations in three-dimensional (3D) tooth size images obtained through various digitization methods in comparison to traditional plaster models made from alginate impressions, considered the gold standard in tooth measurement. The study included 30 participants (10 males and 20 females). Measurements were conducted on four types of models: digital models obtained through intraoral scanning (1), digitized models from plaster casts made from alginate impressions (2), digitized models from plaster casts made from silicone impressions (3), and plaster models made from alginate impressions. Mesio-distal (MD) and buccal/labial–lingual/palatal (BL) dimensions were measured on the reference teeth on the right side of the jaw. Statistical Data Analysis: Statistical analyses, including repeated measurement analysis of variance, Friedman test, and intraclass correlation coefficient, were employed to compare tooth sizes among different methods and assess their agreement. Measurements obtained from plaster models generally exhibit greater repeatability when compared to intraoral scans, followed by digitized models of plaster cast obtained from silicone impressions, and least commonly from alginate impressions. The better levels of agreement were more frequently observed among digital models compared to measurements using digital calliper on the plaster models. The similar levels of agreement were found between measurements on plaster models and digital models in both the maxilla and mandible, as well as in the anterior, middle, and posterior parts of the dental arch. Differences in measurements are primarily due to random rather than systematic errors. Differences in measurements between digital models and conventional plaster models were small and clinically acceptable, supporting the reliability and reproducibility of 3D digital models.

Key words: 3D digital models, plaster models, accuracy, reproducibility, reliability.

#### SOFT RELINING OF 3D PRINTED DENTURES

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To investigate the tensile bond strength between additive manufactured denture base materials and soft denture liners and to determine the type of failure. Three denture base materials were used in this study: two additive manufactured and one heat polymerized as a control group. Two soft denture liners were used, one acrylate based and one silicone based. Tensile bond strength test was performed according to the ISO No. 10139-2:2016 specification and the type of failure was observed. Kruskal–Wallis test with Dunn's post hoc test was used to analyse the values of tensile bond strength, and Fisher's exact test was used to analyse the type of failure. P-values < 0.05 were considered statistically significant. The tensile bond strength between acrylate based soft denture liner and additive manufactured denture base materials was lower than in the control group, but not statistically significant ( $p > 0.05$ ). Tensile bond strength between silicone based denture liner and additive manufactured denture base materials was statistically significantly lower than in the control group ( $p < 0.05$ ). The type of failure between acrylate based soft liner and heat cured denture base material was predominantly cohesive, while between the two additive manufactured denture base materials and acrylate base soft liner was predominantly adhesive. The type of failure between heat cured material and silicone based material was predominantly cohesive. The type of failure between additive manufactured denture base material and silicone based soft liner was also predominantly cohesive. Compared with heat cured denture base material, additive manufactured denture base materials showed lower values of adhesive tensile strength for both acrylic and silicone based soft denture liners.

Key words: soft denture liner, denture base, additive manufacturing

#### RELATIONSHIP BETWEEN CAMPER'S LINE AND THE OCCLUSAL PLANE IN TOOTHED EUGNATHIC SUBJECTS

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The main goal of the study is to examine and confirm the relationship between the Camper's line and the occlusal plane in toothed eugnathic subjects. Thirty toothed eugnathic dental students participated in the study. Fox's plane was positioned on the upper teeth of each patient and photographed in a lateral projection from a distance of 1 meter. Photos of the subjects were then transferred to a computer program where Camper's line was drawn between the marked points on the lower edge of the nose wing and the middle part of the tragus. The angle enclosed by Camper's line and the external part of Fox's plane was measured. Statistical analyses: For each category, basic statistical values were calculated (minimum, maximum, arithmetic mean, standard deviation). The collected data

were entered into the Microsoft Excel 2007 computer program (Microsoft, Redmond, Washington, USA) after which tables and graphs were generated. The average absolute value of the angle is 3.67° and there is no absolute parallelism between these two lines. In 40% of all study participants, the lines form a negative angle. The percentage of subjects whose absolute angle value was up to 5° is 63,33% (n=19) which is considered the optimal angle. After calculating the characteristic statistical values and creating graphical representations, it was determined that the actual angle values tend to be normally distributed according to the Gaussian curve. There is no absolute parallelism between the Camper's line and the occlusal plane. 63,33% of subjects have a favorable relationship between these two lines. The actual angle values between the two lines tend to be normally distributed along the Gaussian curve.

Key words: occlusal plane, camper's plane, occlusion, ala-tragus line

#### INLAY VS. CONVENTIONALLY RETAINED DENTAL BRIDGE – A FINITE ELEMENT ANALYSIS

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This study aimed to compare inlay-retained bridges to conventionally retained ones, using finite element analysis to evaluate the mechanical properties of both dental bridge geometries. The geometry of the second premolar and the first and second molars of the mandible were obtained from CBCT imaging and imported into Mimics software (Materialize, Belgium). Two zirconium oxide bridge geometries were constructed in SolidWorks software package (Dassault Systèmes, France). Seven simulations of two bridge geometries were carried out in Abaqus software package (Dassault Systèmes, France). Simulations of static load strains were conducted and analyzed. Both bridge geometries were loaded with force increments of 100 N between 100N and 700 N. Significant stress concentrations were found in the connectors between retention elements of bridge geometries. Maximal stresses on the models resulted in 543.19 MPa for inlay and 330.52 MPa for conventional bridge. Shifts in the axial direction were observed at intervals of 1.22-8.52 μm for the conventional bridge and 1.46-10.24 μm for the inlay-retained bridge. The results of this study proved the equivalence of strength and rigidity of inlay-retained and conventional bridge geometries when replacing one tooth in the posterior segment of the jaw. Given that inlay-retained bridges require significantly less preparation and are thus more sparing for hard dental tissues, they should be given priority over conventional bridges in cases of healthy abutment teeth.

Key words: finite element analysis, fixed bridge, inlay, zirconium oxide

#### GENETIC POLYMORPHISMS AND RESPONSE TO TREATMENT IN TEMPOROMANDIBULAR DISORDERS PATIENTS

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The study aimed to investigate whether the genotypes of single nucleotide polymorphisms (SNPs) in the catechol-O-methyltransferase (COMT) (rs4646310 and rs4680) and the opioid mu receptor 1 (OPRM1) (rs1799971) genes influence the therapeutic response in chronic pain-related temporomandibular disorders (TMDp). Sixty TMDp patients (55 females and 5 males), diagnosed with the Diagnostic Criteria for TMD (DC/TMD), underwent standardised treatment for six-months, including information and education, home physical therapy, and an occlusal splint. Treatment outcomes included: pain intensity, pain-free mouth opening, jaw functional limitation, depression, and anxiety. Polymorphisms were genotyped by Real-time PCR using genomic DNA extracted from buccal mucosa swabs and predesigned TaqMan® SNP Genotyping assays. Changes in treatment outcomes and the influence of genotypes on therapeutic response were analysed with respect to dominant genetic models (the effect of carrying one or both minor alleles was compared to that of both major alleles). Significantly less pain reduction was observed in minor allele carriers of rs4646310, and rs4680 compared to dominant homozygous ( $p < 0.025$ ). Minor allele carriers of rs1799971 and rs4646310 had less improvement in pain-free mouth opening when compared to dominant homozygous ( $p < 0.025$ ). Significantly less anxiety reduction was observed in minor allele carriers of rs4646310 compared to dominant homozygous ( $p = 0.003$ ). Minor allele carriers of the COMT (rs4646310 and rs4680) and OPRM1 (rs1799971) exhibited worse therapeutic response than dominant homozygous for several treatment outcomes. Understanding the influence of a patient's genotype might guide the selection of an appropriate therapy protocol or help us predict the therapy response to already established protocols. Support: Croatian Science Foundation Project IP-2019-04-6211 (PI: Iva Alajbeg) and "Young Researchers"

Career Development Project - Training of Doctoral Students" (DOK-2020-01) (PhD student: Marko Zlendić)  
 Key words: chronic pain, temporomandibular disorders, single nucleotide polymorphism, genotyping, therapy

#### ASSESSMENT OF THE SUCCESS OF ORTHODONTIC TREATMENT USING THE PAR INDEX AND DIGITAL TECHNOLOGIES

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Aim was to evaluate the success rate of orthodontic treatment by using Peer assessment rating (PAR) index at the Department of Orthodontics, Dental Clinic, UHC, Zagreb. Study included total of 396 digital occlusion scans of 198 (117 female, 81 male) patients before and after orthodontic treatment using the iTero Element™ 2 digital intraoral scanner. The average age of the subjects was 13.7 ± 1.81 years, with average duration of therapy 23.55 ± 7.65 months. 183 patients (92.4%) were treated non-extractionally, and 15 (7.6%) with extraction. Statistical analysis: Pearson's correlation analysis was used for comparison of PAR values before and after therapy. The average PAR value at the beginning was 23.21 ± 9.19, and at the end it decreased to 1.96 ± 2.64. The average reduction in PAR value was 21.25 ± 8.79, or 91.4% ± 10.92% of the initial PAR value, which shows a high degree of improvement compared to the initial state. There were no significant differences between male and female subjects in the reduction of PAR values ( $p = 0.929$ ) nor in the percentage of PAR reduction ( $p = 0.887$ ). Comparisons of therapy outcomes between Angle classes showed a significantly higher proportion of „significant improvements" for class II/1 and class III compared to other ( $p = 0.045$ ). Comparison of the outcome of therapy between genders did not show a statistically significant difference ( $p = 0.875$ ). In a comparison of extraction and non-extraction cases, extraction cases had significantly more „significant improvements" ( $p = 0.009$ ). The scatter diagram showed that the outcome for all subjects was „improvement" (52.5%) or „significant improvement" (47.5%), while there were no „worse or no improvement" outcomes. Results showed a high degree of improvement and a high level of success of orthodontic treatment, which is in line with similar studies.

Key words: fixed orthodontic therapy, assessment of treatment success, PAR index

#### COMPARATIVE ANALYSIS OF MECHANICAL PROPERTIES OF METALS FOR REMOVABLE DENTURES BASES

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The aim of this study was to conduct a comparative analysis of the mechanical properties, including E (Young's modulus of elasticity) and Rp0.2 (yield stress at 0.2% offset) of cast Wironium, three distinct variations of printed Wironium, and printed Titanflex®. The primary objective was to assess their viability as base metals for removable dentures. For testing, cylindrical specimens of every substance were consistently manufactured. Printing angles for Wironium and Titanflex® were set at 0°, 45° and 90°, respectively, for determining the potential effects on mechanical properties. Unprocessed metal devoid of surface treatment was exclusively employed. Mechanical tests were conducted to measure E and Rp0.2 for each specimen using standard tensile testing machine (Beta 50-5). The statistical analysis was performed using a t-test for independent samples, with the significance level set at 0.05. The results indicated significant variations in mechanical properties among the materials. Concerning E, all titanium types demonstrated consistently lower values overall, with no significant differences observed within the Titanflex® groups. In terms of Rp0.2, cast Wironium displayed significantly lower values compared to other materials, while Wironium printed at 45° angle exhibited eminently higher values. Furthermore, Wironium printed at 0° angle demonstrated significantly higher Rp0.2 values compared to Titanflex® printed at 90° angle. Our experiment shows statistical differences for both E and Rp0.2. Titanflex® demonstrates reduced stiffness compared to cast and printed Wironium. Cast Wironium exhibits lower resistance to plastic deformation. However, Wironium printed at a 45° angle showcases greater resistance to deformation.  
 Key words: Titanflex®, cast Wironium, printed Wironium, removable dentures bases, mechanical properties

#### DIMENSIONAL CHANGES OF DENTAL ARCHES DURING FIXED ORTHODONTIC TREATMENT IN PARTICIPANTS EXHIBITING CLASS II MALOCCLUSION

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Aim was to assess the impact of non-extraction fixed orthodontic treatment on dimensional changes of dental arches in patients with a Class II molar relationship. To perform this retrospective research, digitized pretreatment casts of 74 patients exhibiting Class II molar relationship and their posttreatment casts were exported from the iTero cloud storage (Align Technology, San Jose, CA, USA). Both pretreatment and posttreatment casts were imported into the OrthoCAD software (Align Technology, San Jose, CA, USA) where digital cast analysis was carried out. In order to evaluate posttreatment changes on dental casts, following variables were measured: maxillary anterior and posterior widths, mandibular anterior and posterior widths, maxillary anterior and posterior lengths and mandibular anterior and posterior lengths. Patients received treatment with intermaxillary Class II elastics and 0.022" x 0.028" slot MBT brackets (Mini Low Profile MBT Bracket Series, Rocky Mountain orthodontics, Denver, CO, USA). Wilcoxon Matched Pairs test, Mann-Whitney U test, and t-test were performed using the Statistica 14.0.0.15 (TIBCO Software, Palo Alto, California, USA). During treatment, there was a significant increase in both maxillary anterior and posterior widths ( $p < 0.001$ ,  $p = 0.003$ ), while no significant difference between genders was observed. Mandibular posterior width did not change significantly, however, an increase in mandibular anterior width was noticed ( $p < 0.001$ ). A significant increase was observed in female participants' casts in comparison to male ones ( $p = 0.033$ ). Although there was a statistically significant increase in mandibular anterior and posterior lengths during treatment ( $p = 0.002$ ,  $p < 0.001$ ), they did not differ significantly between genders ( $p = 0.78$ ,  $p = 0.29$ ). Patients with Class II molar relationship experience significant changes in both maxillary and mandibular arch dimensions during non-extraction fixed orthodontic treatment

Key words: Class II malocclusion, orthodontic treatment, dimensional changes of dental arch, post-treatment casts

#### THE ASSESSMENT OF ACCURACY OF DIGITAL GNATHOMETRIC ANALYSIS PERFORMED ON PRETREATMENT ORTHODONTIC CASTS

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Aim was to evaluate the accuracy of gnathometric measurements performed in software for digital cast analysis. The sample consisted of 100 study casts obtained from 100 patients undergoing fixed orthodontic treatment. Within an hour after taking impressions, casts made of ISO type 4 stone were produced. The conventional measurements on the stone casts were carried out with a precision of 0.01 mm utilizing a digital manual caliper (Mitutoyo Corp., Kanagawa, Japan). Afterwards, in order to create digital models, those same casts were scanned using an intraoral scanner (iTero Element 2, Align Technology, San Jose, CA, USA). Digitized casts were imported in the software for digital analysis (OrthoCad, Align Technology, Inc). The following variables were assessed: mesiodistal widths of teeth, anterior and overall Bolton ratio, overbite, overjet, anterior and posterior arch widths, upper anterior arch length, and depth of the curve of Spee. Paired sample t-test was used to compare the conventional and digital measurements. Conventional measuring with a caliper provided statistically significant greater values of all maxillary and mandibular teeth widths compared to those obtained in software for digital cast analysis ( $p < 0.05$ ). Similar results were observed in the case of the anterior Bolton analysis ( $p < 0.05$ ). Average values of overbite and depth of the curve of Spee obtained during conventional measuring were greater than those acquired digitally, and those differences were clinically significant ( $p < 0.001$ ). The results of measuring upper anterior length digitally were significantly higher than those assessed conventionally ( $p = 0.019$ ). In terms of overjet, overall Bolton, and upper and lower widths, no statistically significant difference between two methods was found. Most of the differences between the two methods were not clinically significant. Hence, digital cast analysis is as accurate as conventional one  
 Key words: orthodontics, caliper, conventional cast analysis, scanning, digital cast analysis



### NEW REFERENCE VALUES FOR DETERMINING GROWTH PATTERN IN CROATIAN ORTHODONTIC PATIENTS

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To test the accuracy of the Zagreb82 MOD cephalometric analysis in determining the growth pattern in the sample of orthodontic patients. Cephalograms of patients aged 10-17 years were divided into two groups: 1. Eugnathic group (N=50, overbite<3.5mm, overjet<3.5mm, Angle class I, dystopia<3mm, total crowding<3mm, total spacing<3mm, SNA81°±3.5°, SNB78.5°±3°, ANB2.5°±2°, Wits -1±2mm), 2. Test group (N=129, overbite <0.1mm for open bite or >4mm for deep bite). The investigated angles were: SN/MeGo, SpPm/MeGo, Y-axis, Bjork's polygon angles (NSAr, SarGo and MeGoAr) and sum of Bjork's polygon angles (hereinafter referred to as Bjork's Sum). New reference values were defined from the mean values and the interval of one standard deviation in the eugnathic group. In the test group, the growth pattern for each patient was determined using the new reference values and the values of the Zagreb82 MOD analysis. T test was used to examine the differences between the new and currently used Zagreb82 MOD analysis. McNemar's test was used to compare the distribution of growth patterns among different parameters. The reference values of the Y-axis angle, the angles of the Bjork's polygon and the Bjork's Sum in the proposed new analysis were significantly different from their reference values from the Zagreb82 MOD analysis (p<0.001). The distribution of growth patterns according to Bjork's Sum differed significantly between the two analyses (p <0.001). In the Zagreb82 MOD analysis, the distribution of growth patterns differed significantly between all parameters (p <0.001), while in the new analysis the distribution of growth patterns did not significantly distinguished among Bjork's Sum, SpPm/MeGo and SN/MeGo angles. There is a difference in determining the growth pattern using the new and Zagreb82 MOD analysis. Bjork's Sum, SpPm/MeGo and SN/MeGo angles are equivalent parameters for determining the growth pattern within the new analysis. Key words: deep bite, open bite, cephalometric values, growth pattern

### COOPERATION BETWEEN THE DOCTOR, DENTIST, PHARMACIST AND NURSE DURING THE APPLICATION OF THERAPY FOR THE TREATMENT OF ORAL DISEASES IN PEDIATRICS.

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This study aims to investigate the effectiveness of interdisciplinary collaboration among doctors, dentists, pharmacists, and nurses in the application of therapy for the treatment of oral diseases in pediatric patients. This study used a systematic literature review regarding the cooperation between the doctor, dentist, pharmacist and nurse for the treatment of oral diseases. Utilized electronic databases including PubMed, MEDLINE, Scopus, and Google Scholar. Keywords included „interdisciplinary collaboration”, „pediatric oral diseases”, „doctors”, „dentists”, „pharmacists”, „nurses”, „treatment effectiveness”, „patient satisfaction”, and „adherence to therapy protocols”. Extracted data including study design, participants' characteristics, intervention details, outcomes measured, and key findings. Synthesized findings from selected studies to identify patterns, trends, and discrepancies. Assessed the quality of included studies using established criteria such as the Cochrane Collaboration's tool for assessing risk of bias. Statistics: Descriptive statistics were used to summarize the demographic characteristics of the study population, including age, gender, and medical history. The results indicate that interdisciplinary collaboration significantly improves the overall management of oral diseases in pediatric patients. Close coordination among healthcare professionals led to timely diagnosis, comprehensive treatment planning, and optimized medication therapy. Furthermore, patients who received care through interdisciplinary collaboration demonstrated higher levels of satisfaction and better adherence to treatment regimens compared to those managed through conventional approaches. In conclusion, the cooperation between doctors, dentists, pharmacists, and nurses plays a crucial role in enhancing the quality of care for pediatric patients with oral diseases.

Key words: interdisciplinary collaboration, oral diseases, pediatric patients, treatment, conventional approaches

### USE OF MEDICAMENTS FOR THE TREATMENT OF MALIGNANT DISEASES OF THE ORAL REGION IN CHILDREN AND THE ROLES OF THE ONCOLOGIST, PEDODONTICS, CLINICAL PHARMACIST AND NURSE IN THIS PROCESS

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The aim of this study is to explore the role of pharmaceutical agents in treating malignant conditions within the pediatric oral region, emphasizing the significance of collaborative efforts among healthcare professionals including oncologists, pedodontists, clinical pharmacists, and nurses. A thorough search of relevant databases including PubMed, MEDLINE, and Cochrane Library was conducted to identify studies focusing on pharmaceutical interventions for pediatric oral cancers. Keywords such as „pediatric oncology”, „oral malignancies”, „pharmaceutical agents”, and „interdisciplinary collaboration” were used. Data on treatment methods, collaborative roles of healthcare practitioners, medication oversight, and patient outcomes were extracted from selected studies. The extracted data were synthesized to identify common themes, challenges, and successful strategies in managing pediatric oral cancers through interdisciplinary collaboration. Given the nature of this study as a literature review, statistical analysis was not applicable. However, qualitative synthesis of data was performed to derive empirical insights. Pharmaceutical agents play a pivotal role in managing pediatric oral cancers, including chemotherapy, targeted therapy, and supportive care medications to mitigate side effects. Oncologists diagnose and formulate treatment regimens, pedodontists address dental-related concerns, clinical pharmacists ensure medication oversight, and nurses provide essential care and assistance. Effective management of pediatric oral cancers relies on seamless collaboration among oncologists, pedodontics, clinical pharmacists, and nurses. Through interdisciplinary cooperation, healthcare professionals can enhance patient well-being and treatment success by addressing challenges and optimizing pharmaceutical interventions.

Key words: pediatric oncology, oral malignancies, medicaments, collaboration, pedodontics

### OUR EXPERIENCE ON THE SURGICAL TREATMENT OF CHEILO-GNATO-PALATOSCHISIS – CASE REPORT

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Cheilo-gnato-palatoschisis are congenital defects that may cause severe functional and aesthetic problems. Except for the genetic factors there are also many other environmental factors such as: X-ray exposure, corticosteroids, alcohol and drugs, infections and exposure to chemical and mechanical factors that play a role in the development of such defects. The aim of our study is to present our experience on the surgical treatment of cheilo-gnato-palatoschisis. This is a case report study which includes 2 patients, 1 female and 1 male. We performed the surgery on the female patient after the 7th month of birth while we performed the surgery on the male patient after the 8th month of birth. The surgery was performed under general anesthesia, we had neither intra-operative nor post-operative complications. We had very positive results after the surgical treatment of our cases. We managed to improve the functional and aesthetic aspects, increasing like this the quality of life of our patients.

Key words: cheilo-gnato-palatoschisis, surgical treatment, functional, aesthetic aspect

### IMMEDIATE LOADING ON ONE-PIECE IMPLANTS -ROOTT; CHALLENGES AND ADVANTAGES – CASE REPORT

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One-piece implants have a unique monoblock design that enables the surgeon to complete the treatment in only one phase, therefore it is a very efficient procedure that shortens the treatment time and helps to preserve the tissue. The aim of this study is to present our experience with immediate load on one-piece ROOTT implants and to present the challenges and advantages of this type of treatment. This is a Case Report type of study which includes 3 patients, 2 male and 1 female patient. The surgical procedure was performed under local anesthesia in all 3 cases, there were no intra-operative or post-operative complications. In 2 patients we used the Mucoperiost lifting technique while on one

patient we used the Mucotome. Case 1: Partial anodontia in the maxilla, where we used the mucotome where we have implanted 6 one-piece ROOTT implants. Within 5 days of the surgical procedure we have put the fixed prosthesis. Case 2 & 3: we have implanted 8 one-piece ROOTT implants in one case and 20 implants in the other case. In these cases we have used the mucoperiosteal lifting technique. In both cases we have put the fixed prosthesis within 2 weeks of implant surgery. Current practice and also our experience show that using immediate load one-piece implants is superior compared to conventional implants because it is much more convenient for the patients but also for the surgeon. Key words: one-piece implants, immediate load, ROOTT implants  
Key words: one-piece implants, immediate load, ROOTT implants

#### DENTAL WORK-UP OF PATIENTS UNDERGOING HEART VALVE REPLACEMENT SURGERY

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Even though there is a general agreement that patients undergoing heart valve surgery need to undergo dental screening, there is no consensus on the extent of the treatment. Aim was to analyze dental procedures in patients undergoing heart valve surgery. Retrospective chart review from the hospital information system at the University Clinical Hospital Centre Zagreb was performed on patients that underwent heart valve surgery between years 2021 and 2023. Data on sex, age, diagnosis, DMFT and need for dental procedures were registered in the Excel worksheet. Data on dental procedures (no. and type of extractions, caries removal, endodontic treatment, calculus removal, antibiotic administration, complications after procedures, number of appointments needed to obtain dental clearance) were registered as well. One hundred fifty-three patients underwent dental work-up in the studied period. Most frequent diagnosis was aortic stenosis (80; 52.3%). Most commonly performed procedures were dental extractions (76; 49.7%) and calculus removal (29; 19%). Endodontic treatment was performed in 7(4.6%) patients and caries removal in 2(1.3%) patients. One hundred and fifteen (75.2%) patients were prescribed antibiotic treatment. Complications occurred in 6 patients (3.9%) being mostly prolonged bleeding (4; 2.6%) which was treated by local haemostasis. No difference in the frequency of procedures and complications was observed between males and females and among patients with different diagnoses. Median number of appointments required for obtaining dental clearance for heart valve surgery was 1(1-4). Dental work-up of patients undergoing heart valve surgery is a safe procedure with low complication rates. Dental clearance for the procedure can usually be obtained in one appointment. Key words: heart valve surgery, dental work-up, complications, outcomes

#### BUILDING A BRIDGE TO DENTAL CARE: ANESTHESIOLOGY AND DENTISTRY PARTNERSHIP FOR MENTALLY CHALLENGED PATIENTS

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In most cases, dentists and oral surgeons find their way with the patients on their own. However, there are more than a few cases in which they need to work together with anesthesiologists in order not even to examine the patient, but merely to come close to him. This is mostly the case with little children or mentally challenged patients. Although we are all familiar with diagnostic and therapeutic guidelines related to our field of work, when it comes to patients who are mentally incompetent and unwilling to cooperate, we simply must take a different look at the patient and adapt to different working conditions. It is well known that the first contact with a patient means everything. This can be the turning point for the dentist/patient or anesthesiologist/patient relationship. Unfamiliar space, food and drink deprivation, invasive procedures - anything can pose an unresolvable problem. Crying and resisting implies increased oral secretion, enhanced respiratory tract irritability, greater potential for laryngo- and bronchospasm. Their fear can even escalate to a point of endangering themselves or the medical staff. Therefore, it's a challenge for us to obtain a patient who is peaceful and cooperative, ready to be discharged from the hospital rather quickly, mostly within hours. For pediatric patients, the most important mental stability factor are psychological support, involvement of the parents in the process, and their presence in the operating room while entering anesthesia. Simply - the more stressful a hospital visit is, the weaker the cooperation we get. We would like to present methods which we developed during many years of experience in the field when it comes to treating children and mentally challenged patients for dental or oral pathology. It has been proven that we must do everything in our power to help our patients feel comfortable and safe. There is no doubt that a patient who enters the operating room peacefully, carries greater risk for complications. Small compromises can greatly influence

the induction and later course of anesthesia and a dental procedure. Therefore, we must adjust to the patient at our most - both dentists/oral surgeons and anesthesiologists and work all together as a team.

Key words: anesthesiology, mentally challenged patients, dental care

#### COVID-19 VACCINATION FOR HEALTHCARE WORKERS: SHOULD I GET ANOTHER BOOSTER SHOT?

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Anti-SARS-CoV-2 IgG antibodies were monitored in healthcare workers (HCWs) after vaccination with the BNT162b2 SARS-CoV-2 mRNA vaccine as a protection against COVID-19. Materials and methods: This study included 587 two-dose BNT162b2 primovaccinated HCWs (2038 sera samples). Anti-SARS-CoV-2 IgG antibodies were measured 3 weeks after the first vaccine dose (FVD) and then 1, 3, and 6 months after the second dose (SVD) with an anti-SARS-CoV-2 S1 IgG immunoassay (Architect, Abbott). Antibody monitoring was continued after the booster in 405 HCWs (1133 sera) before the booster dose (BD), i.e. 9 months after SVD, and then 1 week, 1, 3 and 6 months after BD. In COVID-19 naïve participants, 3 weeks after FVD antibody titer (873.5 AU/mL) was 18-fold higher than the test threshold (50 AU/mL), with a significant increase after 1 month (9927.2 AU/mL) and an exponential decrease 3 (2976.7 AU/mL) and 6 (966.0 AU/mL) months after primovaccination. Participants with a prevaccination history of COVID-19 showed significantly higher antibody levels after the FVD (14,280.2 AU/mL) with a slight decline 1 month (12,700.0 AU/mL) and an exponential decline in antibody titers 3 (4831.0 AU/mL) and 6 (1465.2 AU/mL) months after primovaccination. Median antibody titer 9 months after the SVD (582.6 AU/mL) was 1.7-fold and 16.4-fold lower than the peak titer after the FVD (961.5 AU/mL) and the SVD (10,232.6 AU/mL), respectively. One month after vaccination, anti-SARS-CoV-2 IgG increased 40.6-fold after the BD compared with a 10.8-fold increase after primovaccination. Three and six months after vaccination, post-booster antibodies decreased significantly slower (2.2 and 4.5-fold) than after primovaccination (3.3 and 9.6-fold). Anti-SARS-CoV-2 IgG antibodies decrease rapidly after primovaccination and more slowly after the booster vaccination. The COVID-19 triggers antibodies. Vaccination is necessary, but with consideration of individual risk, immune status and the adaptation of the vaccine type to mutated viruses. Key words: healthcare workers, anti-SARS-CoV-2 antibodies, BNT162b2 vaccine, booster dose, Croatia

#### ANTIBIOTIC CONSUMPTION IN THE COUNTIES OF SLAVONIJA IN THE REPUBLIC OF CROATIA

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To investigate antibiotic consumption prescribed in public health system's dental offices from 2015. to 2020. in the counties of Slavonija in Republic of Croatia. 1.583.088 data (ePrescription) were collected from the Central Information Health System of Croatia (CEZIH) in the period of five years. E - prescription contained data about types of prescribed antibiotics, number of antibiotics' prescription, indication for the drug's use and geographical locations of dental practices. The consumption of antibiotics is expressed in Defined Daily Dose per 1000 inhabitants per day (DID), which is calculated using this formula: Utilization in DDDs x 1000/ No. of inhabitants x No. of days in the period of data collections. Linear regression was used for statistical data processing to analyze trends. Consumption in Viroviticko - podravska county was in 2015. 2.50 DID and in 2019. 3.05 DID. In Osječko - baranjska county was 2.10 DID in 2015. and 2.31 DID in 2019. In Požeško - slavonska county was in 2015. 2.20 DID, and 2.40 DID in 2019. In Brodsko - posavska county was 1.86 DID in 2015. and in 2019. 2.17 DID. In Vukovarsko - srijemska county was in 2015. 2.01 DID and in 2019. 2.21 DID. In the observed period the highest consumption was in Viroviticko - podravska county and the lowest in Vukovarsko - srijemska county. An increase in consumption was recorded in all counties with significant increase in all counties except Osječko - baranjska and Požeško - slavonska county.

Key words: Antibiotics, Consumption, Defined Daily Dose

### „THE IMPACT OF THE COVID-19 PANDEMIC ON THE USE AND EFFECTIVENESS OF ANTIBIOTICS AT THE UNIVERSITY CLINICAL DENTAL CENTER OF KOSOVO: COMPARISON FOR THE PERIOD 2019 - 2022 AT THE ORAL SURGERY CLINIC“

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In 2020, the Ministry of Health in Kosovo made a national decision to suspend dental services from March 20, 2020, to June 18, 2020. This suspension significantly impacted patients due to the unavailability of essential health services. Consequently, this research aims to compare the outcomes of administering various classes of antibiotics to patients at the University Dental Clinical Center of Kosovo for dental treatment, specifically during the COVID-19 period until 2022. Antibiotic prescribing was monitored for four years (2019- 2022) in the clinic of oral surgery of the University Clinical Dentistry Centre of Kosovo. The analysis included the number of prescriptions and the type of antibiotic prescribed. The World Health Organization's INN and ATC codes are used to classify antibiotics. Data were processed using MS Office Excel. During the study period from 2019 to 2021, a total of 578 patients received antibiotic therapy, comprising 39% male and 61% female recipients. In 2022, 149 patients received antibiotic therapy, with 42% being male and 58% female. Furthermore, between 2019 and 2021, a total of 686 antibiotic prescriptions were issued for 578 patients, while in 2022, a total of 181 antibiotic prescriptions were recorded. In the years 2019 to 2021, Metronidazole was the most commonly prescribed antibiotic, accounting for 364 prescriptions or 46% of all prescriptions. Conversely, in 2022, out of a total of 181 prescriptions, the most frequently prescribed antibiotic was amoxicillin + clavulanic acid, constituting 46% of all prescriptions. Based on the study findings, it is notable that Metronidazole accounted for 46% of all prescriptions from 2019 to 2021, while its prescription rate decreased to 11% in 2022. While amoxicillin with enzyme inhibitors constituted 10-12% of prescriptions from 2019 to 2021, only 4 prescriptions, or 0.02% were in 2022. The study results provide a clear situation on the prescription of antibiotics during and after health emergencies such as epidemics/pandemics and provide an opportunity to create clear models of approach to epidemic/pandemic problems for patients and dental practitioners, especially in the design and adoption of therapeutic protocols for specific indications in dentistry.

Key words: Antibiotics, dentistry, epidemics/pandemics, Oral Surgery Clinic, Metronidazole

### CONTROL OF DENTAL ANXIETY USING MUSIC AND VIBRATORY ACOUSTIC STIMULATION ON PATIENTS WITH ANXIETY AND DENTAL PHOBIA

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Pain, fear and anxiety are the main culprits for not visiting the dentist regularly. The goal of this research is to show how using music and vibroacoustic stimulation we can influence the reduction of dental anxiety. Anxious patients were selected using the Norman-Corah test (231). Before the dental procedure, levels of dental anxiety were assessed with the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS), the scale for evaluating dental concerns, the Anxiety Sensitivity Index 3 (ASI) and the Sikov self-assessment scale (SAM), and after (CFSS) -DS and (HIMSELF). The patients were classified into three groups: (1) The music group (N = 77) was exposed to listening to music, (2) the vibroacoustic group (N = 77) to low-frequency sound vibrations, and (3) the control group (N = 77) underwent kindly before and during the dental procedure. In all groups, the changes were statistically significant, and the greatest effect was recorded in the vibroacoustic group of subjects. Differences in the level of fear of the dentist, dental examination, teeth grinding, sound of drills, feeling of suffocation, and dental calculus cleaning between CFSS-DS responses before and after the dental procedure within each of the three groups are statistically significant. Musical and low-frequency vibroacoustic stimulations have a positive effect in controlling dental anxiety and motivating patients for dental procedures. Key words: dental anxiety, music therapy, vibroacoustic stimulation

### UNDER THE BRIGHT SMILE – MENTAL HEALTH ISSUES AMONG STUDENTS AT THE SCHOOL OF DENTAL MEDICINE ZAGREB

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To measure the prevalence and degree of severity of anxiety and depression among undergraduate dental students at the University of Zagreb School of Dental Medicine. A cross-sectional study was conducted during the 2023/2024 academic year among first (n=66) and fifth (n=58) years of undergraduate study. Participation was anonymous and voluntary, and all students signed informed consent. We used a self-constructed questionnaire with socio-demographic items, a Generalized Anxiety Disorder 7-item (GAD-7) scale, and a Patient Health Questionnaire (PHQ-9). Statistics: Statistical analysis was conducted using descriptive methods and parametric and non-parametric tests. The p-value was set at <0.05. Study population included 21 (16.9 %) men and 103 (83.1%) females. The proportion of females was significantly higher (p<0.001). According to the analysis of the GAD-7 and PHQ-9 questionnaires, all students showed the symptoms of a general anxiety disorder (mild, moderate, severe), and 98.4% met criteria for mild, moderate, moderately severe, and severe depression. According to the severity of anxiety and depression, 21.2% and 34.2% in 1st year and 18.6% and 27.6% in 5th year students requires psychotherapy, medication, or combination of both. During study prevalence of these categories of anxiety and depression increased with significant comorbidity (rs.=0.67, p<0.001). Gender differences were also pronounced, and average anxiety score is significantly higher among females (4.00±4.69 vs. 6.52±3.94, p<0.001). Similarly, the average depression score is significantly lower in males than in their female counterparts (6.81±4.39 vs. 8.35±4.44, p=0.05). Severe mental health issues affect almost every third dental medicine student. Female students represent majority of students, and they have higher prevalence compared with males. Results emphasized the need for the urgent implementation of support and prevention during the whole academic curriculum.

Key words: Patient Health Questionnaire (PHQ-9), generalized anxiety disorder (GAD), dental students, mental health

### ASSESSMENT OF ORAL HEALTH ACTIVITIES IN RELATION TO CLINICAL ORAL HEALTH INDICATORS – A PILOT STUDY

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The Oral Health Activities Questionnaire (OHAQ) developed and validated in 2022 on a sample of 658 university students is considered a useful instrument for determining the level of oral health (OH) status and for quick and reliable classification of individuals based on their OH activities and behaviors. This pilot study aimed to assess the validity of the OHAQ in the general population in relation to their OH status. We used a convenient sample of patients from two dental offices in Split and Zagreb. Patients completed the OHAQ. Two authors (OG, MK) performed clinical assessments, including DMFT index, plaque index measured at four tooth surfaces, and the number of fixed and/or mobile prosthodontic or fixed orthodontic appliances. All patients were given written informed consent, and the study was approved by the University of Split School of Medicine Ethics Committee. Correlations of the OHAQ measures and clinical status were analyzed. We used cut-off values of the sum of OHAQ variables to compare clinical findings in patients with high and low OH activities. Overall 41 patients were included, 14 males and 27 females. The mean number of decayed, missing, or filled teeth was 0,26 (SD 0,54), 3,76 (4,60), and 6,56 (SD 5,07) respectively. On average, there were 7,32 (SD 4,49) teeth with dental plaque, with a mean value of 14,84% (SD 9,49) for tooth surfaces positive for dental plaque. There were no significant correlations between measures of OH activities and the clinical indicators. However, the direction of the correlation coefficient is within the expected reach (range from 0.03 to -0.33). T-test analysis hasn't found significant differences between patients with high and low OH activities and their clinical status. Although the small and heterogeneous sample prevented this pilot study from reaching significant findings, this study should be continued to allow for a larger sample to more precisely confirm the expected relations.

Key words: OHAQ, questionnaire, oral health, clinical assessment, oral health activities

## LONG-TERM IMPACT OF MASTICATORY-GUSTATORY STIMULATION WITH EDUCATIONAL INTERVENTION IN PATIENTS WITH BURNING MOUTH SYNDROME

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To assess long term effects of approach comprising masticatory-gustatory stimulation and educational intervention in burning mouth syndrome (BMS) patients. 88 BMS patients included in protocol involving a use of sugar-free chewing gums and candies, coupled with information sheet and verbal counselling on the condition and coping techniques, were contacted by phone one year after the initial admission and asked to report again on the intensities of burning pain, as well as on the psychological burden, by use of numerical pain rating scale (NPRS) from 0-10. Descriptive notes of interviews were also taken. Out of the initially planned number of participants, 18 did not respond to the call and were excluded from the study. For the remaining 70 participants (M:10, F:60; median age 60, IQR 52-70), a statistically significant difference was found in the intensity of burning and psychological burden of the discomfort (both  $p < 0.001$ ). The results for the intensity values of pain in the form of burning/psychological burden of the discomfort were as follows, respectively: remission 35.3%/57.4% improvement 33.8%/36%, no improvement 27.9%/6.6%, and worsening 2.9%/0%. A higher proportion of patients with previous placebogenesis to some other presumed treatment before the application of our intervention had a tendency towards greater reduction of the intensity of psychological burden caused by complaint ( $p = 0.041$ ). There is a correlation between the duration of burning symptoms and the impact of this approach on the intensity of burning pain, with greater remission being more prevalent in patients with shorter duration of symptoms before diagnosis and management (Cramer's  $V = 0.328$ ;  $p = 0.009$ ). The largest proportion of patients who were unhappy due to absence of effective medication also had poorer long-term response (Cramer's  $V = 0.310$ ;  $p = 0.020$ ). This new diagnostic-therapeutic approach offers a different perspective on BMS. It does not contain untrue statements or pharmacological interventions, nor their serious side effects, while simultaneously offering long-term efficacy in alleviating the painful and psychological components of BMS.

Key words: burning mouth syndrome, stomatodynia, orofacial pain, pain management

## DOES EXPOSURE TO BURNT AND HEATED TOBACCO AFFECT THE ABUNDANCE OF PERIOPATHOGENIC SPECIES IN THE SUBGINGIVAL BIOFILM?

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Subgingival polymicrobial biofilm in periodontitis abounds with typical periopathogenic bacteria and can be affected by tobacco smoking. This research explored the effect of exposure to nicotine-containing heating and burning tobacco products on subgingival microbiome in relation to presence of clinically diagnosed periodontitis. Sample included 66 subjects aged 26-56 (median 38; 64% females) in three age and gender matched groups (each  $N = 22$ ): non-smokers, classic cigarettes smokers and tobacco heating system (THS) smokers. Full-mouth periodontal examination was performed and 330 paper-point swabs from periodontal pockets were collected. The next-generation sequencing of 16S rRNA gene to identify subgingival microbiota was used. Periodontitis prevalence increased in the following order: THS (41%) < non-smokers (44%) < cigarette smokers (68%) but without statistically significant differences between groups. The number of periopathogenic species increased in the following order: non-smokers without periodontitis (median 5 species) < smokers without periodontitis (5.5) < THS without periodontitis (6) < non-smokers with periodontitis (6.5) < THS with periodontitis (7) = smokers with periodontitis (7), differences not reaching statistical significance. In multiple linear regression periodontitis was the only predictor of the number of periopathogenic species, when controlling for the effect of consumption of burnt and heated tobacco ( $R^2 = 0.163$ ;  $p = 0.005$ ). Quantity of subgingival periopathogenic species is more affected by periodontitis than tobacco smoke regardless of whether tobacco is heated or burned. However, smoking showed a tendency to increase the abundance of periopathogenic bacteria. Acknowledgement: Funded by Croatian Science Foundation No IP-2020-02-4027 (Environmental factors and microbiological interactions in the structure of dental biofilm).

Key words: cigarette smoking, electronic nicotine delivery system, periodontal pathobiome, subgingival microbiome, 16S sequencing

## THE DIET OF THE INHABITANTS OF BLATO ON THE ISLAND OF KORČULA 2000 YEARS AGO AND TODAY

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The objective of this research is to compare the impact of eating habits on the teeth and supporting dental tissue of the residents of Illyrian origin who resided in the region near the Kopila hillfort, close to Blato on the island of Korčula during the Late Iron Age, and the current residents of the same area. The study analyzed 479 permanent teeth and jaw remains from 50 individuals of an archaeological population from the Kopila necropolis. It also included 30 plaster models of modern residents' jaw impressions. The analysis examined tooth morphology, pathology, and odontology. Modern residents filled out questionnaires about their diet and hygiene and underwent clinical examination. In the archaeological population, 5.85% of teeth had dental caries, and 85.2% showed dental wear, which was equally distributed across all teeth. 29.44% of teeth showed Grade 1 (enamel wear) according to Smith and Knight, and a total of 46.14% showed Grades 2 and 3 (enamel and dentin wear, without pulp exposure). Calculus deposits were not seen, and the average resorption of the alveolar ridge was 4.84 mm, mostly in individuals over 30 years of age. In the modern population, caries was present in 42.24% of teeth (in 96.67% of people), and dental wear in 32.35% of teeth (in a total of 86.7% of people). All the wear was Grade 1, mostly on the incisors (88.0%). Calculus deposits and gingival bleeding were seen in 86.67% of people, and shallow pockets (4-5 mm) were present in 13.33% of people. Orthodontic irregularities were present in 80.0% of people. In terms of tooth size, there were slight differences in all dimensions in favor of the modern population. Archaeological teeth showed mostly healthy teeth due to non-cariogenic food, but abrasive changes due to poorly ground grains. Modern teeth had more caries and periodontal changes due to processed food and poorer hygiene.

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Key words: bioarchaeology, teeth, caries, tooth wear, odontology

## USING ARTIFICIAL INTELLIGENCE TO IDENTIFY HUMAN TEETH IN MIXED DENTITION FROM ORTHOPANTOMOGRAMS

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The aim of this research was to develop and test an artificial intelligence model that can identify teeth from orthopantomograms (OPGs) in children. The research used 598 OPGs. 540 images were used as some were excluded due to low contrast, poor visibility and artifacts. Within the OPGs, teeth were marked in the form of a square (bounding box) that framed each individual tooth. The images and their bounding boxes were divided into a training group (420) and a test group (120). The training group was presented to the convolutional neural network with the exact type of the tooth according to FDI notation. The architecture used is Yolo.v8, a deep learning detection model used for object detection in images and videos. The test dataset had no influence on the convolutional neural network training process. We ran 2 separate tests on the same specimens. In the first one we analyzed all of the teeth including all four quadrants. In the second experiment we merged upper quadrants and lower quadrants. The hypothesis was that due to the symmetric properties of teeth we would get a better result due to a higher number of images per group. In the first experiment we had a general precision of 87,36% in identifying teeth. Teeth 71,81 (deciduous lower central incisors, left and right) were not analyzed as less than 5 teeth were present. In the second experiment we had a general precision of 0.9064 (90,64%) in identifying teeth. Tooth group lower deciduous central incisor was not analyzed as less than 5 teeth were present. The developed convolutional neural network model successfully determined which teeth were present on an image with an accuracy of (87,36%) in the first experiment and (90,64%) in the second. Both models were able to distinguish deciduous from permanent teeth and properly mark the teeth according to the FDI nomenclature system. An exception to this were lower central incisors due to a small number of teeth on OPGs. This is expected as the age of people whose OPGs were included was 6-16 years of age. According to previous research, it is concluded that a larger number of samples would bring even better results.

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Key words: forensic dentistry, neural network models, pediatric dentistry, radiography

### DENTAL AGE ASSESSMENT: ORTHOPANTOMOGRAM-BASED COMPARISON OF TRADITIONAL METHODS WITH ARTIFICIAL INTELLIGENCE

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A pilot study compared traditional methods with artificial intelligence for dental age assessment in adults. 20 digital orthopantomograms of adult individuals of known age from the Department of Dental Anthropology radiographic database at the School of Dental Medicine, University of Zagreb, were used. Specific teeth prescribed by each of the traditional methods were analyzed: the permanent right central incisors (method of Kvaal et al.), permanent lower first molars (method of Drusini), and the permanent upper canines (method of Cameriere et al.). The fourth method involved an artificial intelligence-based application developed at the Faculty of Electrical Engineering and Computing, in collaboration with the School of Dental Medicine, University of Zagreb. Pearson's correlation coefficient and Bland Altman analysis were used to compare the accuracy of different methods. The dental age assessment using artificial intelligence correlates most with the actual age of the individual ( $r=0.817$ ;  $p>0.001$ ). Statistically significant correlations are shown by the methods of Kvaal et al. and Cameriere et al. ( $p=0.025$ ), but they are insufficient for practical relevance ( $r=0.489$  and  $0.476$ , respectively). In contrast, the method of Drusini ( $r=0.352$ ,  $p=0.102$ ) does not correlate, nor is it practically relevant. According to Bland-Altman's analysis, all four methods overestimated the actual age of the subjects. The dental age estimation using artificial intelligence is closest to the actual age of the individual (bias: +2.1 years), while the remaining traditional methods overestimate age (Cameriere +3.43, Drusini +3.47, and Kvaal +4.8 years). Although artificial intelligence overestimates the actual age of the subjects, it is more accurate in comparison to traditional methods in this study and has the potential for use in forensic dentistry. **Keywords:** dental age assessment; orthopantomogram; traditional methods; artificial intelligence; forensic dentistry **Key words:** dental age assessment, orthopantomogram, traditional methods, artificial intelligence, forensic dentistry

### THE CLINICAL UTILIZATION OF MODERN TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN DENTAL MEDICINE

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The purpose of this study was to assess the attitudes and utilization practices of artificial intelligence and modern technologies among dentists. The cross-sectional study was conducted using a self-reported questionnaire among 198 participants, 92.4% ( $n=183$ ) of whom were general dentists. The questionnaire collected sociodemographic data, knowledge about the application of AI in dentistry, usage practices and attitudes towards barriers to the implementation of AI and modern technologies in clinical practice. The majority of respondents rated their current knowledge and understanding of modern technologies and artificial intelligence as basic ( $n=72$ , 36.4%) or weak ( $n=55$ , 27.8%). While AI systems were not widely used in clinical practice ( $n=150$ , 75.8%), they were most commonly used in dental prosthodontics ( $n=26$ , 13.1%) and oral surgery ( $n=20$ , 10.1%). A significant percentage of respondents (78.3%,  $n=155$ ) expressed a willingness to undergo further training to improve their understanding and use of artificial intelligence, with 71.2% ( $n=141$ ) viewing modern technology and AI as a means of improving the quality of treatment for patients. In dental prosthetics, AI is seen as having the greatest potential ( $n=143$ , 72.2%), particularly in the planning of restorations. The main obstacles to the integration of modern technologies and artificial intelligence into clinical practice cited by respondents included acquisition and maintenance costs ( $n=118$ , 59.6%) and financial constraints ( $n=116$ , 58.6%). Despite a clear interest in education about modern technologies and artificial intelligence to improve the quality of patient care, the dentists who participated in this study showed insufficient knowledge about these topics. Financial constraints proved to be the main reason for non-utilization and limited understanding of the topic.

**Key words:** artificial intelligence, dental medicine, knowledge, modern technology, practice

### CINEMATIC RENDERING IN DENTAL PALEORADIOLOGY

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Dental paleoradiology is an interdisciplinary field that employs advanced imaging techniques to non-destructively examine fossilized teeth. By combining radiographic data and paleontological evidence researchers analyze tooth morphology, pathology, wear patterns, and even diet-related characteristics of ancient populations. There are several modes for 3D reconstructions based on CT scans such as standard 3D multiplanar reconstructions (MPR), surface-shaded resurfacing (SSD), and volume rendering technique (VRT). Unlike these methods, cinematic rendering (CR) is a novel post-processing technique that utilizes advanced algorithms to generate photorealistic images of high-density structures and pathologies such as bones, teeth, and tissue calcifications. This study aims to create CR reconstructions to evaluate the dental status of mummified remains from the Archaeological Museum in Zagreb. The dental analysis included a CT investigation of 5 whole mummies and two heads using an MDCT unit (Sensation 16; Siemens Healthcare, Erlangen, Germany). Using the CR technique, teeth and jaws closely resemble anatomical reality, and dental features are shown with exceptional detail and depth. Some teeth were missing part of its anatomical crown which was probably chipped off postmortem. The lack of third molars could, despite the scant evidence of developed oral surgery in ancient Egypt, indicate the surgical extraction of teeth. Signs of tooth wear, along with skeletal osteoarthritis changes presume the mummy should be at least 40 years old. Three third molars were not in occlusion and the fourth third molar missing indicating that the head belonged to a younger person, around 20 years old. The other head had all the teeth in occlusion and closed cranial sutures, meaning the person was between 30 and 40 years old. Prognathism of the upper jaw was seen in both head specimens. An accessory tooth behind the lower left canine was found in one specimen. In the context of dental paleoradiology, CR promises to provide insights into oral pathologies and procedures in the past and unveil patterns of dental diseases that have persisted over time with practical implications for modern dentistry and medicine.

**Key words:** cinematic rendering, mummies, paleoradiology

### ADVANTAGES OF DENTAL AGE ESTIMATION BY TOOTH CEMENTUM THICKNESS IN MOLARS

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Our research was aimed to establish the equation and to determine its precision for dental age estimation (DAE) based on the thickness of deposited dental cement in molars. The study sample consisted of 146 donor teeth of both sexes (10 to 82 years of age). We used only teeth types that we had in our sample represented in a significant number for all decades of life (premolars and molars) as the chronological age has a significant influence on mean cement thickness (MCT). The roots were transversely cut (6 cuts) on an ISOMET 1000 cutter at apical, middle, and cervical parts (slice thickness 0.3 to 0.5  $\mu\text{m}$ ). Measurements of cement thickness on incisions were made with a light microscope and an Olympus EP50 camera with previous microscope calibration for each measurement episode. Measurements were carried out clockwise at 4 measuring points on each incision. Statistical analyses were conducted using statistical software MedCalc<sup>®</sup> version 22.0. We have analyzed 90 molar teeth (20 M1 and M2 teeth and 70 M3) and 56 premolar teeth. Mean cement thickness (MCT) significantly declined from apical to cervical cuts ( $P<0.001$ , ANOVA) and was thicker in teeth with a destroyed tooth crown ( $P<0.001$ , ANOVA) and in molars compared to premolars and wisdom teeth ( $P=0.026$ ,  $P<0.001$ , ANOVA). Compared to our previous analysis of MCT in all teeth types we have showed a significant increase though all chronological age decades independently of cuts ( $P<0.001$ , ANOVA). The prediction equation for dental age for molars is:  $\text{DAE (yrs)} = \text{minimal CT for cuts } 1-4 * 0.05785 + \text{M1/M2} * 11.7 + 10.47$  ( $r = 0.532$ ,  $p<0.001$ ). We found a significant correlation between dental age and cement thickness in molars through the whole age span.

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**Key words:** age estimation, cementum thickness, molars

### ACCURACY OF OLZE, HAAVIKKO AND DEMIRJIAN METHOD IN ASSESSING LEGAL AGE THRESHOLDS IN CROATIAN CHILDREN AND ADOLESCENTS

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This study aims to explore the efficacy of three established approaches for age estimation of legal age threshold in a sample of Croatian children and adolescents. Olze's third molar eruption stages, Haavikko method and Demirjian method were applied in a total of 586 orthopantomograms of Croatian children and adolescents aged 10.00-20.99. Mandibular second and third molar were assessed. Chronology was established by age distribution by stages. Receiver operating characteristic (ROC) curve and the area under the ROC curve (AUC) were performed to select optimal cut-offs for 16- and 18-year-old thresholds. Generally, mandibular second molar at Haavikko Rc, Demirjian G and eruption C are under 16; mandibular third molar at Demirjian D and eruption B are below 18 in both sexes, and at Haavikko Crc in females and R1/4 in males are generally below 18. Haavikko Ac and Demirjian H were optimal cut-off stages for both 16-year-old threshold (AUC 0.854, sensitivity 100%, specificity 70.77% in females; AUC 0.839, sensitivity 100%, specificity 67.78% in males) and 18-year-old threshold (AUC 0.963, sensitivity 100%, specificity 92.69% in females; AUC 0.973, sensitivity 100%, specificity 94.56% in males). Eruption D stage can be used for 16-year-old threshold (AUC 0.753, sensitivity 80%, specificity 70.54% in females; AUC 0.842, sensitivity 100%, specificity 68.35% in males). The three methods are reliable for age estimation in Croatian children, but their value in determining legal age thresholds is limited.

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Key words: age estimation, legal age threshold

### DETECTION OF SEPERATED ENDODONTIC INSTRUMENTS IN FILLED ROOT CANALS USING CONE-BEAM COMPUTED TOMOGRAPHY AND DIGITAL PERIAPICAL RADIOGRAPHY

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This study compared the accuracy, sensitivity, and specificity of cone-beam computed tomography (CBCT) and digital periapical radiography in identifying separated endodontic instruments in patients with filled root canals. The sample population included patients undergoing primary or secondary root canal treatment at the Department of Endodontics and Restorative Dentistry, University of Zagreb. A total of 32 patients were enrolled, including 16 patients with separated instruments (stainless steel hand file or rotary instrument) inside a root canal after performed root canal treatment and 16 patients without separated files. Root canal obturation was performed on all the patients. Postoperatively, patients received a CBCT and digital periapical radiography for the evaluation of the root filling and periapical healing. Two postgraduate students who did not participated in treatments of enrolled patients evaluated each image for the presence or absence of fractured files. The accuracy, sensitivity, and specificity measures for each method were estimated. The data were evaluated by Fisher exact test. Cohen kappa was used to evaluate the observer agreement. The interobserver kappa was 0.678 and 0.827, and between the observers, it was 0.627 and 0.563 for digital periapical radiography and CBCT imaging, respectively. Six instruments were identified in digital periapical radiography (37.5%) and none in the CBCT protocols ( $P > .05$ ). This study showed that digital periapical radiography is more accurate and sensitive imaging technique, with 60% and 37.5%, respectively. Digital periapical radiography is better imaging diagnostic tool to evaluate the presence of separated endodontic file inside a filled root canal compared to the CBCT. However, most of the separated instruments were not identified. This research was funded by the Croatian Science Foundation project 'Structure and bonding surface modification of biomaterials and hard dental tissues', IP-2022-10-6065.

Keywords: CBCT, separated instrument, endodontics

### DIAGNOSTICS OF OCCLUSAL CARIES USING ELECTROCONDUCTIVE METHOD, DIAGNODENT PEN AND DIAGNOCAM – A PILOT STUDY

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The aim of the study is to evaluate the electroconductive methods based on direct current (DC) and alternating current (AC), ICDAS classification, DIAGNodent Pen and DIAGNocam in the diagnosis of caries confined to the enamel and spreading into the dentin in comparison with histological findings.

A total of 19 areas on 13 extracted teeth were examined using the ICDAS method and two electroconductive devices, the AC-based CarieScan Pro and a DC-based prototype measuring device. The probes used in both devices were endodontic instruments, #10, #15 and #20 spreaders made of stainless steel and nickel-titanium alloy. The same areas were examined with the DIAGNodent Pen and the DIAGNocam device. Subsequently, 1.5 mm thick vertical sections were made through the examined areas in relation to the occlusal surface using an Isomet saw, and the histologic specimens were examined under a stereomicroscope at 15x magnification, photographed and analyzed. The results were statistically analyzed using the Spearman correlation coefficient and the ANOVA test, and the sensitivity, specificity and accuracy of each method were determined. The Spearman's correlation coefficient shows that the highest agreement exists between the ICDAS method and histologic findings (0.9). The correlation between the DIAGNodent Pen and DIAGNocam devices and the histologic findings of enamel and dentin caries is statistically significant ( $p < 0.001$ ) with sensitivity (83%, 72%), specificity (89%, 75%) and accuracy (72%, 74%). The results for the DC method were analyzed with the ANOVA test and there is no statistically significant correlation for the presence of enamel caries, while they are statistically significant for dentin caries with sensitivity (77%), specificity (77%) and accuracy (79%), with the differences related to the type of material or the dimensions of the measuring probe not being statistically significant. The results of the AC method are not statistically significant. ICDAS method showed the best results in caries detection, what justifies its widespread usage in clinical practice. DIAGNodent Pen and DIAGNocam can be reliably used in the diagnosis of enamel and dentin caries with and without cavitation, while the DC method proved to be accurate only in the diagnosis of cavitated lesions and dentin caries.

Keywords: caries, electroconductivity, endodontic instruments, DIAGNodent Pen, DIAGNocam

### ORAL MANIFESTATIONS OF MEGALOBlastic ANEMIA- A CASE REPORT

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Megaloblastic anemias can have oral manifestations, such as glossitis, angular cheilitis, candidiasis, diffuse erythema of oral mucosa, oral ulcerations and burning sensations. Because of oral complaints, the patients frequently visit their dentist first so the dentist has an opportunity to participate in establishing the diagnosis. A 62-year-old female patient was referred to the Department of Oral Medicine, School of Dental Medicine, University of Zagreb because of oral burning symptoms and oral ulcerations which were present for several months. Consumption of all food and drink caused symptoms, except water. She was undergoing prosthetic rehabilitation and the dentist suspected an allergy to dental materials. Her medical history revealed hypothyroidism and laryngopharyngeal reflux for which she was taking levothyroxine and pantoprazole. Clinical examination revealed glossitis with papillary atrophy and multiple areas of erythema in the vestibule and buccal mucosa. The mucosa was without ulcerations, but appeared atrophic. The patient reported that she has had her complete blood count done a month ago where the number of erythrocytes was decreased and their mean corpuscular volume was increased, but after this finding she was not referred for further evaluation and treatment. The patient was sent to make fresh findings of complete blood count, together with cobalamin, folic acid and iron levels. A diagnosis of megaloblastic anemia was established based on low levels of cobalamin and the patient was referred to her medical doctor for treatment with cobalamin. Malabsorption of cobalamin (vitamin B12) can have several etiologic factors, among which is long-term use of proton-pump inhibitors which are normally prescribed for gastroesophageal and

laryngopharyngeal reflux disease. Oral manifestations of megaloblastic anemia can be seen in 50-60% of patients with this diagnosis. The dentist can suspect this condition and refer a patient to his/her medical doctor for further evaluation.

Key words: megaloblastic anemia, malabsorption, oral manifestations, glossitis, erythema

#### INTERDISCIPLINARY APPROACH TO THE MAXILLAR FRONT TEETH TRAUMA THERAPY: A CASE REPORT

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This case report aims to present the treatment of trauma to the maxillary lateral and central incisors in a twenty-year-old female patient. An interdisciplinary approach was used to optimize the outcome of the selected therapeutic procedures.

As a result of the road traffic accident, an avulsion of teeth 11 and 22 and an extrusion of teeth 12 and 21 occurred. The teeth were repositioned and a semi-rigid splint was placed. Twenty days after the trauma, the teeth were mobile, the papillae were negative and inflamed, and the electrical excitability test of the pulp of all four teeth was negative. The radiograph showed extensive loss of interdental bone between teeth 12 and 11 and 21 and 22. Due to ischaemic necrosis of the pulp, endodontic treatment was performed on all four teeth followed by initial periodontal therapy. Fixation with a wire-composite splint was repeated, this time on the palatal surface of teeth 13-23. One week later, Straumann® Emdogain® (Straumann, Basel, Switzerland) was applied intrasulcularly to the root surface under local anesthesia. The next control x-ray is scheduled for one month after the treatment. The start of regeneration of the periodontal tissue is expected. When the teeth are sufficiently stabilized, the wire-composite splint will be removed. Conclusion: With an interdisciplinary approach and the use of biological materials, it is possible to achieve satisfactory results even with such extensive dental trauma.

Key words: interdisciplinary approach, maxillar, front teeth, trauma