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Napoca Biodent 2021

New Challenges in Dental Research

10th Edition

5th - 6th November 2021

Editors:
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The manuscripts do not necessarily represent the points of view of the editors of this supplement. The authors are responsible for the content of their papers.

simpozionul internațional de stomatologie napoca BIODENT

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Scientific Program
International Symposium Napoca Biodent 2021
10th Edition
New Challenges in Dental Research

FRIDAY 5th of November 2021		
	Time	**Program**
Opening Ceremony	**08:30-09:30**	**Opening Ceremony** Prof. Dr. Mihaela Băciuț, Prof. Dr. Dorin Borzea, Prof. Dr. Diana Dudea, Assoc. Prof. Dr. Dinu Cristian, Assoc. Prof. Dr. Anca Mesaroș
Session 1 Conferences	*Chairs:*	***Prof. dr. Aranka Ilea, Assoc. Prof. Dr. Marius Manole***
	09:30-10:00	**Prof. Dr. Cosmin Sinescu** New biomaterials for bone augmentation
	10:00-10:20	**Prof. Dr. Mariana Ionita** Graphene based materials for bone regeneration
	10:20-10:40	**Prof. Dr. Sanda Mihaela Popescu** Biomaterials used in alveolar site preservation
	10:40-11:00	**Prof. Dr. Horia Manolea** Biocompatibility assessment of bone augmentation materials
	11:00-11:30	**Prof. Dr. Norina Forna** New Challenges regarding pro-implant guided bone regeneration techniques
	11:30-12:00	**Break**
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	12:10-12:20	**Dr. Alexandru Gratian Grecu** Social and psychological aspects of oral and general health among undergraduate students
	12:20-12:30	**Dr. Antonia Boca** Chronic apical periodontitis between local and general effects
	12:30-12:40	**Dr. Javier Ruiz-López** Color variations in bucco-lingual sections of human extracted teeth
	12:40-12:50	**Dr. Emma-Cristina Draghici** Socio-demographic determinants of partial edentulism among adult patients in Dolj County, Romania
	12:50-13:00	**Dr. Chen Zong T**racking human periodontal ligament stem cells in vivo: new method
	13:00-13:10	**Dr. Radu Chifor** Artificial Intelligence in dentistry: research advances in periodontal disease diagnosis.
	13:10-13:20	**Dr. Sanda Ileana Cîmpean/Sebastian-Roberto Matei** A comparative in-vitro study between different methods of root canals final irrigation: microbiological and scanning electron microscope evaluation
	13:20-13:30	**Dr. María Tejada Casado** Color prediction of layered dental resin composites
	13:30-13:40	**Dr. Roxana Marinescu** How widely is evidence-based dentistry used in practice?
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	14:20-14:40	**Prof. Dr. Meda Lavinia Negruțiu** 3D Printing technologies for dental prostheses - encountered issues
	14:40-15:00	**Lecturer Dr. Daniela Maria Pop** Processing technologies of polymers for provisional prosthesis
	15:00-15:20	**Prof. Dr. Iulian Antoniac** Biodegradable metals-potential applications in dentistry
	15:20-15:40	**Prof. Dr. Veronica Mercuț** Etiological aspects of non-carious cervical lesions
	15:40-16:00	**Prof. Dr. Monica Scrieciu** Considerations regarding the associations between tooth loss and cardio-vascular disease

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	17:10-17:20	**Dr. Mirela Fluerașu** New perspectives in the treatment of bruxism
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	18:55-19:00	**MDT Daniel Adrian Târtea** The benefits of full digital workflow from intraoral scanning to final restoration
	19:00-19:05	**Stud. Jean Louis Kelian Vingadassalon** Cerec Smile Design
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	15:00-15:20	**Prof. Dr. Ligia Vaida** The impact of face-mask wearing on adolescent orthodontic patients during the Covid-19 Pandemic
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	17:50-18:00	**Dr. Silvia Maria Vele** The effect of operative stress on the glycemia variations in the dental practice
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	18:10-18:20	**Dr. Bianca Varvară** Chairside CAD-CAM milling materials-optical properties assessment after exposure to cigarette smoke
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* Abstract is missing from the abstract book as it was accepted for full-text publication in our Journal.

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CONFERENCES

FRIDAY 5th of November 2021

Session 1

New biomaterials for bone augmentation

Cosmin Sinescu[1], Alin Gabriel Gabor[1], Cosmin Vancea[2], Petru Negrea[2], Cristian Zaharia[1], Liviu Marsavina[4], Virgil-Florin Duma[1,3,4], Radu Negru[4], Meda Lavinia Negrutiu[1], Mihai Rominu[1]

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2) Polytechnic University of Timisoara, Faculty of Chemistry and Environmental Engineering, CAICAM Department, Timisoara, Romania

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Introduction and objectives. An essential problem for bone tissue engineering is the design of bioceramics scaffolds that combine high porosity with appropriate mechanical properties. In addition, a resistant surface is required to have a controllable sample for both in vivo and in vitro applications.

Material and methods. Different procedures for bone scaffolds are presented. The characterization of bioceramics scaffolds was done by X-Ray Diffraction (XRD) Analysis, Apparent porosity, Scanning electronic microscopy (SEM), Optical 3D microscopy. We made the decision to use the same characterization methods provided in the literature and we also added an innovative method to describe the new material proposed, Optical Coherence Tomography (OCT).

Results and discussion. Following the characterization of the ceramic samples obtained, we can say that obtaining the scaffolds of this type of ceramics through the foam replication method is similar to the structure of the natural bone. Compared to other methods of obtaining, as mentioned in the literature, following the analyzes used, the samples proved to be closer to the optimal values of restoration of bone defects. After SEM analyzes it was found that the pore morphology is an open one and comprises pores with variable dimensions depending on the area of analysis. The external structure of the scaffolds mimics cortical bone tissue being much denser, with a much-reduced porosity.

Conclusions. The proposed bioceramics scaffold could act as a promising future bone augmentation material. Further tests need to be done in order to put this material on the market.

Graphene based materials for bone regeneration

Mariana Ioniță

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Graphene the outstanding material of our time is highly foreseen to provide advantages that bring about unique applications rather than simply an improved substitute to current materials. Debatably approaches regarding graphene and graphene derivatives manufacture, characterization as well as combination with other atoms or materials in the view of obtaining new nanocomposite materials or introduce new functional properties were reported in the literature. These previous studies have

contributed to an improved understanding of how different graphene and graphene derivatives can be specifically manufactured and tailored in order to meet certain demands for particular application. In the current study on the one hand we describe graphene functionalization methods to enhanced interaction with biomolecules and assess the suitability of graphene as platform for developing a biosensor for osteogenic potency assays. On the other hand, new biocomposite scaffolds based on graphene and biological polymer were developed and investigated as potential material for bone regeneration. Structural analysis by Fourier Transform Infrared spectrometry (FT-IR), X-ray diffraction (XRD) and transmission electron microscopy (TEM) but also 3D analysis by X-ray microtomography (microCT) and scanning electron microscopy (SEM) were performed. The mechanical tests revealed that graphene indeed has a benefic effect on polymers resistance against compressive stress, improving their compressive strengths by 97 – 100% with the addition of 0.5 – 3 wt.% graphene while biological assessments showed the development of a biocompatible material. Much has yet to be discovered in order to provide new health sector product nonetheless graphene seems to play a key role in improving the features of scaffolds for bone tissue engineering.

Acknowledgments. This work was supported by a grant of the National Authority for Scientific Research and Innovation, Operational Program Competitiveness Axis 1 - Section E, Program co-financed from European Regional Development Fund „Investments for your future" under the project number 154 / 25.11.2016, P_37_221 / 2015.

Biomaterials used in alveolar site preservation

Sanda Mihaela Popescu[1], Veronica Mercuț[1], Horia Octavian Manolea[1], Adrian Camen[1], Cristina Maria Munteanu[1], Alex Sălan[1], Radu Andrei[1], Antonia Khaddour[1], Adrian Marcel Popescu[1], Oana Gîngu[2]

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The tooth extraction results in a bone defect due to the resorption of the alveolar process as a result of the disappearance of the special type bone lamina cribriforma and the dento-alveolar ligament. Preserving the dimensions of the alveolar process is important in the implanto-prosthetic treatment, because it greatly simplifies later the therapeutic procedure, eliminating the need for difficult surgeries, such as sinus lifting and sinus augmentation. The post extraction augmentation technique has multiple advantages, such as maintaining bone and soft tissue, but the disadvantage is the delay of implant insertion by 6-8 months. The biomaterials used for this technique are varied, from resorbable and non-resorbable membranes, PRF, PRGF, allograft, xenograft and alloplast bone materials, collagen, and other biomaterials. The problem of identifying the best material for maintaining the size of the post-extraction alveolar process is constantly being debated, as new biomaterials are constantly emerging whose properties remain to be demonstrated. Research in this area is needed both to discover new biomaterials and to evaluate their effects over time. This paper tries to present the biomaterials used in these techniques, emphasizing the main advantages but also their properties, as well as the disadvantages of each method and biomaterial used.

Biocompatibility assessment of bone augmentation materials

Horia Manolea, Alexandra Drăghici, Ioana Mitruț, Ioana Tamara, Eugen Osiac, Sanda Mihaela Popescu, Laurențiu Mogoantă

University of Medicine and Pharmacy Craiova, Romania

A sufficient bone volume is the main condition for the stability and long-term osseointegration of dental implants. Thanks to numerous surgical procedures and the latest research, the possibility of reconstructing bone tissue is now much more predictable than in the past. Bone replacement materials play an important role in oral rehabilitation. A wide range of bone augmentation materials have been so far approved for clinical use , but even this wide variability makes it difficult to choose the ideal material for each case.

Biocompatibility assessment of bone augmentation materials can be done by several methods, but histological examination remains the main tool that can provide data on the integration of these materials in bone tissue. Studies can be performed on laboratory animals or clinical studies on human subjects.

Our studies were performed on Wistar rats and aimed to evaluate the integration mode of some commercial bone augmentation materials, but also some experimental materials.

Well-designed observational studies can play a key role in providing a powerful database for the use of bone augmentation materials in a well-documented medical act. As we have also noticed in our study, a simple examination and clinical observation may provide important data related to the integration of a bone augmentation material.

Optical coherence tomography has the ability to monitor noninvasively the healing process of bone tissue both ex-vivo and in-vivo, as opposed to the invasive histological examination which is the gold standard, allowing the differentiation between soft and hard tissues, similar to CBCT and with a higher resolution than radiography, even if it has a lower depth of penetration and a more limited field of view.

In the histological evaluation of the augmented cavities with hydroxyapatite-based materials, it was always noticed the presence of residual particles of synthetic material surrounded by a connective tissue or a young bone tissue with many osteoblasts, depending on the moment of integration of the studied material. No necrosis or encapsulation and rejection areas of the applied material were noticed on all the studied preparations, the degree of resorption of the synthetic material being related to the size of the particles and to the time elapsed from the moment of their insertion.

New challenges regarding proimplant guided bone regeneration techniques

Norina Forna

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Significant changes in the volume and quality of the prosthetic field require guided tissue regeneration interventions performed by specialists in prosthetics, implantology and oral surgery, addressed both bone support (hypertrophic or atrophic) as well as the covering mucosa, to create the most favorable conditions for proper positioning of the future dental implants prosthesis by interventions performed in the prosthetic and proimplant stage. As many edentulous patients candidates to implant-prosthetic therapy have improper bone anatomy of the implant site (height, width, osseodensity), it is requested the clinician must

evaluate the implant sites parameters by using CBCT scans and software applications to improve the planning of the guided bone regeneration techniques. In-depth knowledge of the graft materials and the horizontal and vertical bone regeneration techniques will help the practitioners to recover the biological and psycho-social functions of the patients with severe deficits of the muco-osseous support demanding implant-prosthetic therapy.

Key words: dental implants, alveolar bone, resorption, guided bone regeneration

FRIDAY 5th of November 2021

Session 3

Stabilized zirconia ceramics for dental applications

Marius Manole, Anca Stefania Mesaroș, Diana Dudea, Alexandru Grecu, Alexandru Burde, Amelia Boitor, Cristina Gasparik, Sorana Baciu

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The use of ceramic materials such as zirconia, ZrO_2 in dental applications is highly desirable due to their excellent mechanical and thermal properties, including improved biocompatibility, wear resistance, high chemical durability and good esthetics characteristics (in terms of transparency and color).

ZrO_2 exists in three crystalline polymorph forms, namely the monoclinic, tetragonal and cubic phases, depending on the temperature. The monoclinic ZrO_2 phase exists for temperatures below 11700C and for room temperature. Tetragonal ZrO_2 crystalline phase is stabilized for temperatures ranging between 1170 and 2370^0C. The cubic ZrO_2 phase exists at temperatures greater than 2370^0C. The high melting points ($2700\text{-}2800^0$C), the chemical reactivity of the melt and the presence of polymorphic transitions have largely impeded the synthesis of zirconia based single crystals.

We showed that addition of stabilizers such as Na_2O, SiO_2 and Y_2O_3 with a concentration of 5 mol% and higher up to 15mol% produces numerous vacancies in the oxygen lattice of ZrO_2 and thus generates the formation of the tetragonal zirconia crystalline phase.

The analysis of UV-Vis and PL spectroscopic investigations data reveal that with increase in the Y_2O_3 concentration, yttrium ions lead to the breakdown of silicate network resulting non-bridging oxygen atoms which will decrease the gap energy and the PL intensity.

Keywords: zirconia vitroceramics, tetragonal zirconia, XRD, SEM, FTIR, UV-Vis, spectroscopy

3D printing technologies for dental prostheses - encountered issues

Meda-Lavinia Negrutiu, Daniela-Maria Pop, Cristina Modiga, Emanuela-Lidia Craciunescu, Cosmin Sinescu, Mihai Romînu

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Introduction. The aim of the present study was to observe and present the encountered problems during the manufacturing of dental prostheses through three 3D additive technologies: SLS (selective laser sintering), SLA (stereolithography) and FDM (additive manufacturing by filament deposition).

Material and method. Both, fixed partial prostheses and mobile dentures were made. The 3D design models were chosen according to the types of the desired restorations, the STL files were imported and edited to be further prepared for each software of the used devices. For the SLS technology was used the Formiga P 100 device, with a working space of 200 mm x 250 mm x 330 mm, which produces components from polymeric materials such as polyamide, polystyrene. The Anycubic Photon device, a compact 3D printer using liquid polymer, was employed for SLA technology, with a working space of 115 mm x 65 mm x 155 mm. The material used by the printer was a photosensitive resin. For the FDM method, the ORIGINAL PRUSA I3 MK3S + device was employed, with a working space of 250 x 210 x 210 mm, using filaments of thermoplastic polymers.

Results. The technology in which no major problems were encountered was FDM, the results being quite successful, even if it was expected that this process would have a lower dimensional accuracy than the other procedures.

Conclusions. It takes time for these technologies to be assimilated into daily dental practice. In the future, they may be incorporated into more practical devices for dental appliances.

Processing technologies of polymers for provisional prosthesis

Daniela Maria Pop, Cristina Modiga, Tareq Hajaj, Cosmin Sinescu, Emanuela Lidia Crăciunescu, Meda-Lavinia Negruțiu, Mihai Romînu

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Introduction and objectives. Dental practice is tending to remove the metallic component of fix partial prosthesis due to unfavorable mechanical behavior. The polymers are used for prosthesis with metal free infrastructures and optimal function. The aim of this study is to include optimal conformed provisional prosthesis in complex dental treatments.

Material and method. Polymers used for provisional prosthesis are more performant now. Can be used with different technologies and have different mechanism of initiating the polymerization. Thermoplastic and chemoplastic polymers need different technologies. Technological alternatives for short term or long term polymer

provisional prosthesis are: substractive CAD-CAM, milling, printing technology and polymers injection. To achieve excelent and predictible results, wax-up and mock-up become part of the treatment plan. Milling or printing the polymers involve dedicated technologies and important costs but a correct provisional prosthesis can help in establishing the needed space for the veneering material of future prosthesis, for evaluating the aesthetics and functional occlusion.

Results. Provisional prosthesis are made for morphological and functional rehabilitation on a limited period time. The chosen materials and manufacturing technologies may influence the success of the final prosthetic treatment. The standard and quality of provisional restoration is decisive for a successful prosthetic treatment.

Conclusions. Milled provisional prosthesis, injected or light cured are reproducing the exact shape, color and size of the final one. Materials used are highly biocompatible and resistant to dental plaque adhesion. Present polymers induce low periodontal inflammation due to the lack of residual monomers.

Key words: provisional prosthesis, polymers, alternative technologies

Biodegradable metals – potential applications in dentistry

Iulian Antoniac

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Dental biomaterials offer the clinicians a powerful set of clinical tools for patient treatment and are found in virtually every instrument, device, implant, or piece of equipment. A significant number of materials including metals, ceramic, polymers, composites and some nanomaterials exist and are used in dental medicine for current and potential applications. This paper focuses on newly developed biodegradable metallic alloys with potential application in dentistry as well as the novel technologies used for dental biomaterials processing and characterization. New trends in metallic alloys, surface modification, and characterization techniques will be reviewed and discussed with reference to their relevance in dental biomaterials-tissue interactions phenomena. Because the advanced microscopically techniques such as scanning electron microscopy and atomic force microscopy are used now to determine the interfacial structure/ property/biofunctionality relationships of synthetic dental biomaterials with human tissues, different practical examination of some relevant dental biomaterials will be presented in order to show the advantage given by this techniques. In conclusion, future research and studies on some promising biomaterials are essential in terms of biocompatibility, structure, and properties in order to make them clinically viable. Interdisciplinary research between engineers and clinicians appears to be mandatory in order to be sure that new proposed dental biomaterials and technologies will be applied in practice.

Key words: dental biomaterials, biodegradable metallic alloys, composites, SEM

Etiological aspects of non-carious cervical lesions

Veronica Mercuț, Andreea Stănuși, Monica Scrieciu, Mihaela Sanda Popescu, Diana Vlăduțu, Mihaela Boțilă, Cristiana Petcu, Roxana Pascu

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Non-carious cervical lesions are defined as the irreversible tooth structure loss at the level of cement-enamel junction, due to acting physical and chemical factors, excluding severe trauma or carious lesions. Non-carious cervical lesions present a multifactorial etiology, and they often represent a diagnosis and treatment problem for dental clinicians. Non-carious cervical lesions were first described in 1778 as a form of dental wear, while in 1991 they were identified under the term of dental abfraction, because it was considered that they may appear as a consequence to excessive occlusal forces, inflicting flexural movements within the teeth. The current unanimous view argues for a multifactorial etiology of the non-carious cervical lesions, which includes stress (abfraction), friction (tooth wear) and erosion (biocorrosion).

The current conference describes three studies, which aim to correlate occlusal stress with non-carious cervical lesions. The first study employed the finite element method, starting from a maxillary premolar virtual model and it underlined the stress generated by excessive occlusal forces; the second study applied both the cinematic method and the finite element method, highlighting the stress generated by the resistance forces. The last study used optical coherence tomography, in order to indicate the effects of the stress upon the hard dental tissues.

Key words: non-carious cervical lesions, abfraction, dental wear

Considerations regarding the associations between tooth loss and cardiovascular disease

Monica Scrieciu, Veonica Mercuţ, Sanda Mihaela Popescu, Mihaela Jana Ţuculina, Monica Crăiţoiu, Luminiţa Băguci, Cristiana Petcu, Roxana Marinescu, Simina Găman, Roxana Pascu, Mirela Mihart

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The different forms of edentation represent diseases of the dento-maxillary apparatus characterized by the loss of one, several, respectively of all the dento-periodontal units on one or both jaws. The etiology of edentation is multifactorial, most often involving microbial factors from carious foci or periodontal diseases.

The correlations between tooth loss and cardiovascular diseases are a topical field, still under research. Studies have shown that, although the technology in the field of dentistry has experienced a real progress, edentation has an increased incidence, even in developed countries. Cardiovascular diseases also have an increased prevalence, the risk factors for cardiovascular disease being sometimes similar to those that favor the appearance of edentation.

It is highlighted in multiple researches that oral and dental infections accompanied by tooth loss are associated with an increased systemic level of pro-inflammatory cytokines, thus causing cardiovascular disease. On the other hand, the number of missing teeth can be a predictor of the onset of a cardiovascular disease.

The main cardiovascular diseases that have been studied in relation to tooth loss are: hypertension, ischemic coronary heart disease, changes in the electrocardiogram, aortic valve sclerosis, strokes, atherosclerotic diseases.

The associations between tooth loss and cardiovascular diseases are important in terms of public health, requiring complementary, multidisciplinary prophylactic measures.

Key words: tooth loss, edentation, cardiovascular diseases

SATURDAY 6th of November 2021

Session 1 - New Challenges in Dental Research Event - part I

Recent possibilities to inactivate oral microbes in denture wearers

Cecilia Bacali[1], Mandra Badea[1], Mariana Constantiniuc[1], Marioara Moldovan[2], Rahela Karpa[3], Mirela Moldovan[1], Ondine Lucaciu[1], Smaranda Buduru[1]

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Introduction and objectives. The aim of the study is to analyze the possibility to inactivate oral pathogens in acrylic denture wearers using improved denture base materials and modern disinfecting techniques

Material and methods. A commercial denture base material (Castavaria) with addition of graphene silver particles was used. Photodynamic therapy was associated to enhance the antibacterial effect.

Results. The improved samples showed antimicrobial action, with enhanced effect when associated to photodynamic therapy.

Conclusion. The results obtained in the study show possibility of inactivation of oral pathogens in denture wearers using nanomaterials, the antimicrobial activity can be enhanced by adding photodynamic therapy.

Comparative marginal microleakage evaluation of Bis-GMA and Bis-MEPP composite resin materials

Andrea Maria Chisnoiu

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The present study was designed to compare marginal microleakage in case of two dental composite resins (a recently introduced Bis- MEPP resin - Gaenial A'Chord (GC R&D Japan) and a consecrated commercial Bis- GMA resin- Ips Empress Direct (Ivoclar Vivadent, Lichtenstein), and to observe, by means of scanning electron microscopy (SEM), the differences between these two restorative materials when using the same adhesive system and restorative layering technique. Sixty maxillary

and mandibular molars were included in the study and the occlusal surface of each tooth a Black class I cavity was realized with maximum depth of 3 mm. The prepared teeth were randomly divided into 2 groups of thirty teeth each based on the restorative material as Group A – Ips Empress Direct (n=30) and Group B –Gaenial A'Chord (n=30). Microleakage testing scores were lower in Gaenial A'Chord group, but the results were not statistically validated. SEM images presented a uniform and efficient polymerization on the entire restored cavity in case of IPS Empress Direct samples. The hybrid layer presented a thin, homogenous and electron dense structure with relatively uniform width (~ 2 μm), closely following the dental surface and forming a hybrid layer (5-10 μm) which penetrated the dentin. SEM evaluation in case of Bis GMA resin revealed a porous texture, resin extension intersecting the hybrid layer were observed, having a similar electronic density with the adhesive layer, which demonstrates a continuity of the nanoparticles in depth. On dentin - composite interface increased number of gaps and fissures were observed, comparing to enamel-composite interface. The results of the current study showed that the two investigated materials presented similar characteristics. The material filler content as well as the resin matrix composition and silane coating influences microleakage of dental composites.

Biobanks in research activities - premises and perspectives

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There is no universal definition for the term „biobank" accepted by scientists, but generally this encompasses a set of biomaterials and data, information stored in an organized system, collected from a specific population or subpopulation. Even though biobanks are increasingly recognised as crucial infrastructures for research, biobanking procedures regarding the collection, storage and informed consent may pose barriers and limits for samples and data access. Thus, there is increasing need for a consensus in biobanking practices and improved networking.

Stem cells are highly promising resources for applications in cell therapy, regenerative medicine, drug discovery, toxicology and developmental biology research. Moreover, dental tissues have become an attractive source of mesenchymal stem cells with high potential applicability in numerous clinical disorders, not only for oral cavity, but for the other organs in the body. Mesenchymal stem cells isolated from oral cavity tissues (DSCs) have high differentiation capacity, retain their stem cell properties after cryopreservation and are available sources. Stem cell banking offers the opportunity to cryogenically preserve DSCs at their most potent state for later use for clinical applications. There are some drawbacks in DSCs banking, associated with inter-donor variability, cell culture-induced changes and the use of animal-derived culture medium additives. Standardization and quality control during banking procedures are essential in order to prevent contamination and deterioration.

Only the implementation of standardized, GMP (Good Manufacturing Practice) procedures could ensure successful development of personalized medicine based on stem cell therapies.

Acknowledgement. This study was supported by project CNCS-UEFISCDI, PN-III-P2-2.1-PED-2019-3664 -" Personalized intelligent matrices for tissue regeneration and meta-inflammation control" (PRIM_TISS), No 348PED/03.08.2020.

In vitro testing of the compressive strength in three CAD/CAM materials

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In 2020, CAD-CAM in dentistry represented a market of 2.06 billion dollars Worldwide, with an expected growth of 8.7% annually until 2028 for the United States alone. With an ever-ageing population and the sector becoming increasingly competitive with the rise of larger and „low-cost" dental clinics, it is imperative for dental physicians to find a way to cut cost and treatment time.

With the last generation of CAD-CAM intra-oral scanners (Primescan & Trios 4) closing the gap in accuracy with conventional impressions, more and more dentists get seduced by a faster and easier impression, without forgetting the advantage of a single visit prosthetic restoration for the patient.

If conventional ceramic materials have now been in use for around thirty years, new hybrid materials trying to combine the esthetics of ceramic and the flexural strength of composites are slowly emerging, with a long-term potential of possibly completely replacing ceramic materials in high load-bearing areas, such as the lateral area.

The purpose of this study is to compare the compressive strength of two well-known and studied CAD-CAM materials: a conventional ceramic, IPS Empress (Ivoclar Vivadent, Lichtenstein) and a hybrid composite, Cerasmart (GC Gmbh, Austria), with the newly marketed G-CAM (Graphenano, Spain). The second aspect of this study is to compare the compressive strength of each material at different occlusal thicknesses.

Monolithic versus layered in dental aesthetics?

Bogdan Culic, Anca Stefania Mesaros, Adrian Mihai Varvara, Cristina Gasparik, Diana Dudea

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Introduction and objectives. Choosing optimal restorations in order to restore the basic functions of the dento-maxillary apparatus (physiognomy, phonation, mastication) the knowledge and realization of prosthetic works from ceramic materials is a priority of modern dentistry. Both classical and CAD/CAM techniques are used successfully in performing these types of restorations.

The presentation tried to give an answer to the possibility of systematizing the types of ceramic materials.

Material and methods. Ceramic restorations give great satisfaction from an aesthetic point of view, but they have advantages and disadvantages depending on the type of the ceramic used. Metal-ceramic has the risk of gingival lysereum; feldspar ceramic is fragile and difficult to correct; disilicate lithium ceramics can sometimes be too translucent, zirconium too opaque, the cementing mechanism is different.

Results. Clarification of the indications for choosing ceramics and illustration of its selection is presented in various clinical cases.

Conclusions. The choice of the optimal material for prosthetic restorations depends on the clinical situation.

Dental materials in minimally invasive pediatric dentistry practice

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The medical approach in dental caries treatment is a requirement of modern dentistry. In order to transfer into pedodontic practice the principles of minimally invasive dentistry, dental materials are needed to meet specific requirements that allow ad-integrum enamel preservation or adhesive properties, for cavity preparation with maximum hard dental tissue economy.

The aim of this presentation is to illustrate, through clinical cases, the different types of dental materials used in the minimally invasive approach in child and adolescent patients. The control of the cariogenic microflora, toothbrushing rhythm and technique proved its effectiveness when the effort of the medical team was supported by the family and the patient. The use of products originates for enamel remineralization generated positive effects in dental caries prevention and white-spot lesions control, during orthodontic treatment. The atraumatic restorative treatment, a concept of preventive and restorative approach, by using glass ionomer cements, consents favourable results both in the case of non-compliant patients or when it is limited to perform aerosol-generating procedures.

In conclusion, minimally invasive techniques can be use in pedodontic practice, due to progresses in dental materials. Knowledge of these materials properties, compliance with the application protocol and proper selection of the case, are elements that allow adequate long-term results.

Key words: minimally invasive, dental material, pedodontics

SATURDAY 6th of November 2021

Session 2 - New Challenges in Dental Research Event - part II

How dental dehydration affects *in vivo* teeth color and whiteness: the two minutes rule

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Color and whiteness of an *in vivo* tooth can be influenced by several intrinsic and extrinsic factors, including tooth dehydration. Despite its clinical relevance, information on how dehydration affects tooth color is not sufficient. It seems to be an agreement that dehydration alters color as well as increases the lightness of the teeth, mainly due to the fact that tooth dehydration increases the opacity of the enamel, so that the teeth appears to be whiter. The loss of enamel translucency is related to water

replacement with air within interprismatic spaces, altering light dispersion through these spaces, thus increasing their reflection and originating an effect of increased lightness.

In a recent study, in-vivo chromatic and whiteness changes produced by short-term dental dehydration (up to 10 minutes) were studied on a sample of 452 upper incisors (226 centrals and 226 laterals) of 113 participants using a spectroradiometer. Based on the findings of this study it was concluded that short-term dental dehydration produces statistically significant changes of color of in-vivo teeth. These variations are clinically perceptible after only two minutes and clinically unacceptable after 6 minutes. Dental dehydration also produces an increase in whiteness, statistically significant after 2 minutes and clinically perceptible after 4 minutes.

Therefore, it was recommended that clinical shade matching to de done within the first two minutes of any clinical procedure that requires precise chromatic determination but implies a risk of tooth dehydration.

Shade guides and their configurations

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Introduction and Objectives. To review the factors that influence the quality of the results in the visual shade matching, based on the scientific achievements of the authors. The main focus is on studies that include the role of the shape of shade guide tabs, upon the accuracy and reproducibility of the visual choice of dental color.

Material and methods. Three study protocols are presented, based on the answers of observers with different experience in the field of dentistry, on the dental color matching when using samples with different shapes. In the case of the last protocol, the most widely presented, incisor-shaped (ISG), canine-shaped (CSG), and molar-shaped (MSG) shade guides have been made and further used to color match artificial teeth mounted in a tipodont. The experiments respected the lighting conditions and the observation geometry regulated by ISO-TR 28642/2016. Two factors have been analysed: Accuracy - by the visual-instrumental agreement (VIA), and reliability - by the visual interrater agreement (VIrA). Instrumental analysis was performed with (VitaEasyshade®) spectrophotometer.

Results and conclusions. No statistically significant differences were found when using shade guides with tabs of different shapes for VIA (χ^2 (4, N = 140) = 0.39, p = 0.98) or VIrA (χ^2 (4, N = 187) = 1.78, p = 0.77). However, when color-matching the canines, VIA values were highest when CSG was used (17.5% vs ISG 12.5% and MSG 15%). In the case of molar evaluation, higher VIA results were obtained for MSG and CSG (17.5%) compared to ISG (12.5%). Among the analyzed teeth, both the accuracy and the reproducibility of the color matching was the greatest for the incisors, regardless of the shape of the shade guide used.

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Fixed orthodontics on teeth with irregularities of the enamel - challenges and research perspectives

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Introduction and objectives. Orthodontics is one dental specialty where patients seek improvement of their smile aesthetics. Fixed orthodontic appliances are nowadays the most common mean to achieving functional and aesthetic results. The success of such a treatment often resides in a good adhesion of the brackets to the teeth. The presentation will focus on the challenge of obtaining good adhesion on teeth with enamel irregularities.

Materials and methods. The first part will focus discussing the issues described in the literature, while the second part will present an observational retrospective pilot study on orthodontic patients that presented white-spot-lesions in their history. Charts of these patients were studied for data regarding possible resin-infiltration procedures in their history prior to orthodontic treatment, brand of orthodontic adhesive used and situations of bracket bonding failures during fixed orthodontic treatment.

Results. Although our pilot study included only 27 teeth from 8 patients it was observed that bracket adhesion failures are more often and repeatedly in patients whom had previously had resin-infiltration procedures in combination with one particular type of adhesive, while no statistical differences have been found between the other adhesive technique used and patients that did not have resin-infiltration procedures for their white-spot lesions.

Conclusions. Our preliminary results indicate the need for further research in the field of bracket bonding on teeth with structural irregularities of the enamel.

Acknowledgments. The study was supported by research project PN-III-P2-2.1-PED2019-2953 funded by the Romanian Government.

Cytotoxicity – who's to blame: the material, the dentist or the scientist?

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Cytotoxicity tests are today widely used for the biological evaluation of dental biomaterials. The advantage of these tests is that they are comparatively easy, fast, and inexpensive and that animal experimentation may be avoided. However, a main problem is the clinical relevance of the derived data. Cytotoxicity tests can be used for evaluating the hazard of e.g. dental monomers. For evaluating the risk, other factors such as barriers must be taken into account. However, within a preclinical risk assessment of a new material cytotoxicity data can be used in comparison with similar successfully used market products. The compositions of the materials and the released substances must also be known. Also the dentist plays an important role, because she/he is responsible for the correct use (e.g. curing) or the right indication.

Finally, the scientist is responsible for the adequate selection of the test method and the test conditions. The use of standards may be helpful and should be considered. Finally correct reporting of all test conditions and of derived data is important, discussing in detail the pros and cons of the specific cytotoxicity method used. Therefore, cytotoxicity tests are a powerful method leading to relevant results, if methods and results are applied conscientiously.

SATURDAY 6th of November 2021

Session 3

Ethical concerns and professional duty regarding the dental treatment on patients with eating disorders

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Eating disorders affect about 9% of the population worldwide. Eating disorders are among the deadliest mental illnesses, second to opioid overdose (Arcelus, Jon et al. 2011). 10.200 deaths each year are the direct result of an eating disorder – that's one death every 52 minutes (Deloitte Access Economics, 2020). In Romania there are no statistical data on eating disorders, so far. These behaviors have a significant impact on oral health. Dental erosion is the most common and dramatic oral manifestation of the chronic regurgitation typical of eating disorders (Naidoo, 2015). Dentists are often the first health care professional who face this disorder. How to treat a young female patient with anorexia, for example, who do not recognize her disorder and ask the dentist for cosmetical treatment? To ask her to look and treat first the anorexia and to come then to the dental office, or do not engage with the patient for fear of losing her as patient? The second reaction is not in accord with dental practice ethical principles. But have dentists the necessary information, resources and social support to follow the patient, acting in their best interest and respecting always the principle of beneficence? In order to be a good doctor, dentists should always regard concern for the well-being of their patients as their primary professional duty.

Clinical and radiological in number dental anomalies

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Introduction and objectives. Number dental anomalies are more and more common in orthodontic practice. Therefore, it is very important to have a correct diagnosis from the very beginning.

Material and methods. We studied a number of 24 children, aged between 5 and 18 years, 13 girls and 11 boys. First of all, we examined the patient clinically and a presumptive diagnosis was made, followed by complementary imaging examinations: orthopantomography, profile cephalometry, CBCT and, then, we established a positive diagnosis.

Results. The percentage of number dental anomalies that we found in the studied group was about 9%.

Conclusions. We will always start with the clinical examination of the patient-child and a presumptive diagnosis will be made, which can then be confirmed or not following the complementary imaging examinations.

Key words: number dental anomalies, orthopantomography, profile cephalometry, CBCT

The impact of COVID-19 pandemic on emergency dental care in Mureș county

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Introduction and objectives. In Romania a lockdown was announced after the World Heals Organization declared COVID-19 a pandemic. All nonessential activities, including dental services, were suspended and severe community discipline rules were introduced to prevent the spread of COVID-19. No dental services were provided for two months, except in each county's accredited public emergency dental setting.

This study was aimed to assess the impact of COVID-19 pandemic on the prevalence of patients attending the emergency dental office of Mures County Emergency Hospital in Targu Mures, Romania.

Methods. The nine-year retrospective study was based on the analysis of patients' dental records who received emergency dental services in the Mures County Emergency Hospital of Targu Mures between its establishment on 1st February 2012 and 31st December 2020. Ethical approval was obtained and data were assessed using descriptive statistics.

Results. In 2020 the proportion of emergency dental visits was significantly lower compared to the previous years. Less patients attended for emergency dental care especially from the rural area during the COVID-19 pandemic ($p<0.05$).

Conclusions. The results suggest that the prevalence of patients attending for emergency dental care was lower after the onset of COVID-19 pandemic. However, it may have been expected that the demand for emergency dental care in the Mures County Emergency Hospital would have increase during the lockdown when dental services were suspended or restricted in other dental offices. The most likely explanation may have been related to patients' fear of new coronavirus disease and enforced community discipline.

Challanges in modern orthodontic

Irina Zetu, Cristian Romanec

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The search for a perfect shape of the face, as an integral part of the absolute beauty, is an idea that has its origins in the beginnings of mankind. In this frame of reference, the smile represented and continues to represent a basic element, a personal good, a gateway to the world. Over time, codes, laws, moral precepts, canons, and aesthetic rules, themselves tributary to various religions and philosophies, have somewhat complicated the notion of a smile, which has thus been loaded with symbols involving a multimodal interpretation.

In many cases, the smile is the reason for presentation to an orthodontist, the real chalange of the modern orthodontics. Because of the patient's desire to have a better self-esteem, a better integration in the nowadays society and why not, for a better social acceptance.

Today, in the digital era, the challenge of modern orthodontics is to assess the success or failure of meeting the aesthetic objectives of our treatments by assessing the degree of improvement in the smile aesthetics. In the actual social and economic context, a context that is continuously changing, the orthodontist has the task to approach the patient not only from functional and occlusal therapeutic point of view , but especially from the aesthetic point of view.

The question that orthodontists should answer in the era of digitalization that is our modern, competitive society, would be a simple one: "Do we have to align the teeth that are visible in the smile according to the personality of each patient - child, adolescent or adult, or we have to follow the rules and the canons of the today beauty, with the risk of flattening and depersonalizing the patient?"

The impact of face mask wearing on adolescent orthodontic patients during the Covid-19 pandemic

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Introduction and objectives. The aim of this research was to assess the impact that the restrictive measures that were imposed during the Covid-19 pandemic, and, especially, wearing a face mask had on a sample of Romanian teenagers undergoing fixed orthodontic treatment.

Material and method. 277 orthodontic patients, with ages between 12 and 17.9 years, from North-Western Romania were included in the study and completed a 9 items questionnaire.

Results. Most patients were not concerned about wearing a protective face mask (Item 1) and were not affected by the compulsoriness of face mask wearing (Item 2). The majority of the participants did not consider interrupting the orthodontic treatment due to the compulsoriness of face mask wearing (Item 5), but most of them were not happy that they had to wear a face mask during the orthodontic treatment (Item 6) and did not

want that face mask wearing would continue to be compulsory (Item 7). In general, older patients were less concerned about wearing a protective face mask ($p = 0.001$; $R = -0.24$). Usually, boys were less affected by the compulsoriness of face mask wearing than girls ($p = 0.012$).

Conclusion. Even if most patients would not like to continue wearing the face mask as a mandatory regulation, they are not concerned or negatively affected by wearing a protective face mask.

Orthodontic diagnosis, current trends of high-performance investigations

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Diagnosis and treatment strategies today are based on a large volume of data, constituted in a computerized system and processed by rigorous statistical-mathematical methods. In their turn, the new generations of biomaterials have allowed to increase the quality of the orthodontic medical act. In the face of such developments, the doctor's task becomes even more complex. Their level of knowledge, information and competence must reach those levels, which will enable them to select and apply advanced treatment methods and techniques. Teamwork also becomes indispensable, as the doctor has to deal with such an approach. The evolution of knowledge in medical disciplines such as medical genetics, biophysics, biochemistry, physiology and in the field of biomaterials technology, new acquisitions in medical imaging and radiology, have led to the introduction of new methods and means of diagnosis and treatment in human pathology.

ORAL PRESENTATIONS

FRIDAY 5th of November 2021

Session 2

Social and psychological aspects of oral and general health among undergraduate students

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Introduction and objectives. The purpose of the current study represents a comparative assessment of the oral- and general health self-perception between a sample of dental medical students and a sample of students of other faculties.

Material and method. The Romanian version of the OHIP-49, SF-36 and MDAS questionnaires was applied as an online format to a sample of students enrolled in the Faculty of Dental Medicine, Cluj-Napoca and a sample of students belonging to other non-medical faculties within the same city (overall sample n = 140, age range 18-27 years). The questionnaire scores have been computed and used in statistical descriptive and inferential procedures (IBM SPSS).

Results. Regarding the complete sample, the highest OHIP-49 questionnaire subscale score was reported for the pain subscale (mean score 7.78), while the lowest SF-36 questionnaire subscale score was reported for the vitality subscale (mean score 57.29). The mean MDAS score (8.8) indicated a low level of perceived dental anxiety.

The interrelation between self perceived oral- and general health were investigated using Pearson's correlations. Statistically significant correlations were obtained between OHIP-49 subscale/overall scores and SF-36 subscale scores (i.e. functional limitation with physical pain (r=-0.458**, p=0.001, OHIP-49 overall score with the mental health subscale r=-0.441**, p=0.001). The t-test indicated statistically significant differences in the general health self-perception, in respect to the presence/absence of dental medical studies, for the vitality subscale t(111.92)=-2.483, p=0.014.

Conclusions. The current study describes a statistically significant interaction between the self-perception of oral health and the self-perception of general health, as well as statistically significant differences in general health self-perception, according to the presence of dental medical studies.

Key words: OHIP-49, self-perceived oral health, dental students

Chronic apical periodontitis between local and general effects

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Introduction and objectives. Apical periodontitis is an inflammatory disease caused by microbial infection within the root canal system, resulting in inflammatory periapical tissue and apically bone destruction. It is an inflammatory disease that can lead to systemic inflammation, related to elevated concentrations of inflammatory mediators or reactive peripheral blood cells, impacting on general health status. The main objective of the study was to evaluate the implication of the periapical lesions in the general health and inflammatory status.

Material and method. A number of 200 patients were enrolled in a cross-sectional study of the SALIVAGES project, conducted between 2018-2020. The chronic apical periodontitis diagnosis was established by two independent evaluators in a total number of 82 patients selected according to orthopantomography images. The lab analyses were represented by blood count, total lipids, serum inflammatory factors and carbohydrate metabolism markers. Also, anthropometric measurements and associated diseases were encountered on the time of clinical exam. The data were collected and evaluated using Microsoft Excel for Windows and Spearman's Correlation Coefficient.

Results. Annual increment in patient's age decreases the number of dental units affected by chronic apical periodontitis ($p=0.023$). The number of dental units with chronic apical periodontitis is correlated significantly and negatively with the level of total lipids ($p=0.002$, $R= -0.345$), Body Mass Index (BMI) ($p=0.017$, $R= -0.277$) and age ($p=0.007$, $R= -0.300$).

Conclusion. Reducing the number of dental units affected by chronic apical periodontitis with age is explained by the loss of dental units within the aging processes, and the change of lifestyle respectively.

Color variations in bucco-lingual sections of human extracted teeth

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Introduction and objectives. To evaluate color variations in bucco-lingual cross-section of upper and lower molars, canines and lower incisors.

Material and method. Sagittal bucco-lingual sections (approx. 0.7 mm thickness) of 4 freshly extracted human teeth (upper third molar (UTM), lower third molar (LTM), upper canine (UC) and lower incisor (LI); n=1) were obtained using a low speed diamond saw (Isomet 1000; Buehler). A non-contact spectroradiometer with CIE 45o/0o geometry and a fiber-coupled Xe-Arc light source was used to measure against a black background the spectral reflectance of individualized areas of interest with hard-tissue correspondence for all bucco-lingual sections. CIE L*a*b* color coordinates were calculated for each

bucco-lingua section and group of sections of each tooth.

Results. CIE L* values increased after the first section was removed and either continued to increase (LTM, LI) remained constant (UTM) or slightly decreased (UC) as moving towards lingual direction. In all cases, a significant drop in lightness was registered for the most lingual section of the teeth. In the case of the a* coordinate, its value dropped constantly when moving across bucco-lingual cross-section (less reddish). Lastly, b* values behavior was more erratic. It either increased (UTM, LTM), remained constant (UC) or decreased (LI) after the first section was removed and, afterwards, either slightly decreased and recover (UTM), continued to increase and then decreased (LTM, UC) or continuously decreased while approaching lingual area (LI).

Conclusions. Important color variations were found along bucco-lingual cross-section of all types of studied teeth, although these variations were tooth- dependent.

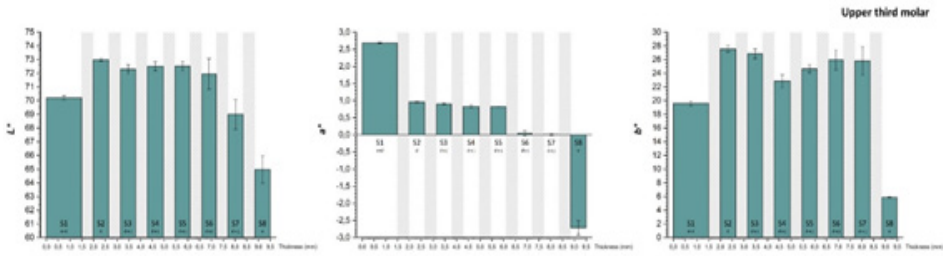

Figure 1. CIE L*a*b* color coordinates variations among consecutive bucco-lingual cross-sections of the upper third molar.

Socio-demographic determinants of partial edentulism among adult patients in Dolj County, Romania

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Introduction and objectives. The objective of this study is to evaluate the association between partial tooth loss and demographic factors and quality of life variables among adult patients in Dolj County.

Methods. The study group included 738 patients who came to Oral Rehabilitation Clinic of the UMPh Craiova. The patients were divided into 3 age groups: 18-30, 31-60 and over 60 years. The data were collected via a structured, pre-tested questionnaire and an oral examination. The patients agreed to participate in the study signing the informed consent.

Results. In the younger group of patients, Kennedy class III edentulism was found in about 27% of cases. In adult patients, Kennedy class III had and increased prevalence again (42%). For elderly patients, predominated Kennedy class I and II (31%).

Conclusions. Among the subjects studied, Kennedy class III was the most common form of partial edentulism in both jaws. With aging, the prevalence of Kennedy class III form of edentulism decreased and Kennedy class I and II increased.

Tracking human periodontal ligament stem cells *in vivo*: a new method

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Introduction and objectives. To label human periodontal ligament stem cells (hPDLSCs) with gold nanocomplexes and to evaluate their detection both *in vitro* and *in vivo* with micro-CT after hPDLSCs transplantation in a rat model.

Methods. The 40 nm gold nanoparticles were coated with poly-L-lysine, while rhodamine B isothiocyanate was added to allow fluorescence visualization. The hPDLSCs were isolated from extracted teeth and characterized as mesenchymal stem cells. Intracellular uptake of gold nanocomplexes was investigated with transmission electron as well as by brightfield and fluorescent microscopy. The cytotoxicity was assessed by AlamarBlue cell viability assay, while the effect of the gold nanocomplexes on osteogenic differentiation was measured using alkaline phosphatase and alizarin red S staining. The CT attenuation of labeled cells was analyzed by *in vitro* micro-CT. Retention and biodistribution of labeled cells after injection in various rat tissues such as muscle and gingiva were evaluated by micro-CT and immunohistochemistry.

Results. The cellular uptake of gold nanocomplexes efficiently labeled hPDLSCs and rendered them fluorescent without affecting cellular viability or osteogenic differentiation capacity. *In vitro*, labeled hPDLSCs were clearly visible with micro-CT, in which the attenuation showed a linear dependence with the number of labeled cells over a wide range. *In vivo*, labeled cells could sustain and be traced up to 5 days after transplantation.

Conclusion. Labeling with gold nanocomplexes could provide strong and durable contrast enhancement of transplanted hPDLSCs for tracking with micro-CT *in vitro* and *in vivo*. *In vivo*, this methodology allows for a longitudinal follow-up within the same experimental animals at different time points, which can provide strong internal comparisons and reduce the sample size. This may facilitate the use of hPDLSCs transplantation in the fields of oral sciences and bone regeneration.

Key words: gold nanoparticles, cell tracking, cellular imaging, periodontal ligament stem cell, micro-CT

Artificial intelligence in dentistry: research advances in periodontal disease diagnosis

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Artificial intelligence process automation is increasingly used in many fields of medicine. Dentistry is not bypassed by this trend and there have been applications of artificial intelligence in the diagnostic process, especially in radiology. More and more software applications based on artificial intelligence algorithms ensure the presumptive

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diagnoses to patients, the design and manufacture of prosthetic parts, even the elaboration of new treatment schemes or new drugs have benefited from this technology.

In the present study, periodontal ultrasonography images of several patients were analyzed and interpreted automatically using artificial intelligence algorithms for the detection of 5 anatomical elements: dental crown, dental root, cortical bone, gingival tissue and periodontal pocket. These elements could be successfully identified with an accuracy of over 80%, shortening five times the time required for the human operator to process the 3D ultrasonographic reconstructions of the investigated areas for periodontal status evaluation purposes.

A comparative *in vitro* study between different methods of root canal final irrigation: microbiological and scanning electron microscope evaluation

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Objectives. The aim of the present study was to assess the effect of 3 different irrigation protocols: QMix 2in1 (Dentsply, USA) as a final endodontic irrigant, in comparison with protocols using activated 5.25% sodium hypochlorite irrigant, with ultrasound and laser systems.

Material and method. The study was conducted on 60 extracted teeth, prepared using a rotary system, that were subjected to a wet sterilization process. Each tooth was inoculated with E. faecalis ATCC 29212. The colonies were scored on a Petri dish counting the CFU (colony forming units) prior to the treatment and after the final irrigation. For the final irrigation of the endodontic canals, the teeth were divided into 3 categories, as follows: 1) 3 ml of Sodium Hypochlorite 5.25% for 1 minute, improved using the EndoUltra System; 2) 1 ml Qmix 2in1 for 1 minute using an irrigation needle; 3) 3 ml of Sodium Hypochlorite 5.25% for 1 minute, improved using the SiroLaser Blue. Twenty prepared teeth were assigned to each group (n=20).

In order to evaluate the specimens by Scanning Electron Microscopy (SEM) (magnification of 45x-2000X), 6 random specimens were selected from each category.

Results. The CFU (colony forming units) mean values were: for the first group-2.85, for the second group-20 and for the third group-=2.35. When comparing the disinfecting methods ANOVA showed that laser and ultrasonic irrigations were significantly more effective ($p<0.05$) compared with Qmix group.

Conclusion. Given the microbiological tests and SEM results, the final irrigation protocol using sodium hypochlorite activated with SiroLaser Blue system is superior and more recommended.

Color prediction of layered dental resin composites

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Introduction and Objectives. The main objective of this study was the development of a Principal Component Analysis (PCA) – based predictive method, for spectral reflectance reconstruction and color estimation of layered dental resin-based composites of varying thicknesses.

Material and method. 25 Bi-layered samples of different clinically relevant thicknesses were manufactured using different shades of VITAPAN Enamel (VE) and VITAPAN Dentine (VD), combined with their corresponding enamel shades. A non-contact spectroradiometer with CIE 45o/0o geometry was used to measure the spectral reflectance of all samples over a standard black background. A PCA-based algorithm was built from a 9-samples training set (heuristically distributed in order to fully encompass the sampling space), while a 16-samples testing set was used for performance evaluation. Root Mean Square Error (RMSE), Goodness of Fit (GFC), as well as ΔE00 with corresponding 50:50% acceptability and perceptibly thresholds (AT and PT) were used as performance assessment.

Results. Performance indicators obtained when comparing measured and predicted spectral reflectances were RMSE < 0.0098 and GFC > 0.9999. Mean color difference among predicted and measured (real) color was ΔE00 = 0.45, with 100% of the color differences (ΔE00) lower than AT and 87.5% lower than PT.

Conclusions. The proposed PCA-based predictive method allowed spectral reflectance reconstruction and color estimation of layered dental resin-based composites of varying thicknesses with a high degree of accuracy. These results open the way for custom design and manufacture of dental resin composites and could be a useful tool for the clinical success of dental restorations.

How widely is evidence-based dentistry used in practice?

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Introduction and objectives. The aim of the study was to evaluate the knowledge and attitude of dentists and students at UMPh Craiova towards the use of evidence-based dentistry in practice.

Material and methods. The study had a structured approach, using a questionnaire for data collection; 100 participants were interviewed: students and teachers from the Faculty of Dentistry in Craiova, resident doctors, as well as dentists with private practice.

Results. The results of the study showed that although most participants were interested in evidence-based dentistry, only 68% considered it very important and only 51% changed a clinical procedure after consulting the evidence in the literature. In terms of barriers that prevent them from using evidence-based practices from the literature in their work, study participants list lack of experience, patient reluctance, office equipment, level of training, lack of materials, anxious patients, and limited access to specialty literature.

Conclusions. Evidence-based dentistry offers the possibility for dental practitioners to enter a new era. Medical opinion formers have an important role to play in providing communication skills, addressing the technical dimensions of dentistry, promoting lifelong learning and bridging the gap between academics and general practitioners so that they can provide patients with the best clinical judgments for an optimal and cost-effective treatment.

Key words: evidence-based dentistry, factors, treatment decision

FRIDAY 5th of November 2021

Session 4

New scaffolds for guided bone regeneration

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Introduction and objectives. The aim of this study was the development and characterization of new scaffolds from polycaprolactone (PCL) loaded with nano-hydroxyapatite (nHAP) and metronidazole (MET) for guided bone regeneration.

Material and methods. The scaffolds with different compositions (PCL, PCL-5%MET, PCL-5%nHAP-5%MET) were obtained through electrospinning. The morphology, fiber size, mechanical properties, cytotoxicity and bioactivity of the obtained scaffolds were analyzed and described.

Results. The results showed scaffolds with the typical electrospun architecture of randomly continuous oriented bead-free fibers. The fibers with a size between 0.6 and 11 μm, formed a porous structure. The mechanical properties showed results situated between 2.2 and 5.2 N for the force at maximum load. For the Young modulus, the results were registered between 7 and 28 MPa. The highest value for stiffness was registered for the PCL scaffolds and was evaluated at 6650 N/m and the lowest value was certified for the PCL-5%nHAP-5%MET scaffolds at 1990 N/m. The tensile strength was registered to be between 1.05 and 2.4 Mpa. The cell viability increased to 97% when nHAP was added and decreased to 65% at addition of MET. The scaffolds with nHAP content showed HAP formation after 21 days in body similar fluid.

Conclusions. The addition of MET lowered the fiber size and the addition of nHAP increased the size of the fibers. The size of the fiber affected the mechanical properties of the scaffolds. The cytotoxicity of the scaffolds was influenced by their composition. The obtained scaffolds could be promising in the field of guided bone regeneration.

Key words: electrospinning, metronidazole, guided bone regeneration, mechanical properties

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Upper airways volume and craniofacial morphology: a CBCT retrospective study

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Introduction and objectives. To assess a relationship between the volume of the upper airways and the facial skeletal pattern in orthodontic patients, through three dimensional (3D) data obtained in CBCT examination.

Material and methods. Pre-treatment CBCT scans were selected from 49 patients who met the inclusion and exclusion criteria. Measurements were made in order to obtain volumetric data, the minimum cross-section, the axial slice of the nasopharynx, oropharynx and the total structure; the cephalometric tracing was performed for the skeletal type. The analysis was repeated in a 22 random sample to determine the intra-operator error. The data was evaluated by a validated method analysis - Kolmogorov-Smirnov, Student's T test and Intraclass Correlation Coefficient.

Results. No statistically significant relationship was found between the ANB angle and the volume of the nasopharynx, oropharynx and total volume, nor with the minimum section and axial section of each of these volume segments. However, there seems to be a relationship between these parameters and the patient's sex, where the male sex has a greater volume than the female sex. Regarding age, there was no statistically significant difference, it appears to be a low to moderate intensity correlation with volume, such that with increasing age there is a decrease in the minimum section of the oropharynx and the total volume.

Conclusions. No relationship was found between craniofacial morphology and upper airway volume. Further well-designed and randomized studies with control groups are needed to scrutinize the potential influence of the skeletal class on the upper airway volume.

Occlusal analysis: analog or digital?

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Introduction and objectives. The aim of this study was to evaluate if T-Scan™ Novus™(TekScan) device could be used as a singular method of evaluation for maximal intercuspation, protrusive and laterotrusive movements in comparison with the calibrated articulating paper.

Material and method. This retrospective, observational study included a number of 10 subjects divided into 2 groups, the first group included patients with at least 10 healthy teeth/dental arch and the second group included patients with implant-supported restorations. The evaluation methods were the calibrated articulating paper

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The first two authors have equal contribution to this study.

and T-Scan™ Novus™. The following data were collected: contact points in maximum intercuspation, the pairs of teeth performing protrusion and right/left laterotrusion. The data were collected and evaluated using Microsoft Excel for MAC 2011 and MedCalc Statistical Software version 19.2.6 (MedCalc Software, Ostend, Belgium). It was tested if there was a statistically significant difference between the two occlusal diagnostic methods using T test for independent samples and Mann-Whitney test. The association magnitude was measured using the Chi-square test (p value).

Results. The difference between the number of contact points between the two types of investigations was not statistically significant when each group was studied: group 1 - T-test p=0.54 and group 2 - T-test p=0.26. There was no statistical significance between the two diagnostic methods regarding protrusion (Chi-square p=0.89 for tooth pairs).

Conclusion. T-scan could be used as a singular method for occlusal analysis. Nevertheless, for a complete and comprehensive occlusal analysis it is recommend the synergistic use of both methods.

New perspectives in the treatment of bruxism

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Bruxism is defined by the American Academy of Sleep Medicine as a "repetitive jaw muscle activity characterized by the clenching or grinding of teeth and/or bracing or thrusting of the mandible". Bruxism can be a common cause of dental wear, dental loss, tooth fractures, alveolar exostosis, muscle pain and the appearance of TMDs.

The etiology of bruxism is still not very well established: centric and eccentric forms, psychogenic and mechanical, awake and sleep forms of bruxism are described. The multifactorial theory is more frequently cited, the appearance of this parafunction being the result of the summation of a series of favoring factors. All this leads to a difficult and uncertain diagnosis of bruxism, but especially to a long treatment with multiple therapeutic scenarios with, however, less spectacular results. Nonetheless, technological progress, digitalization and modern therapies have not bypassed this pathology. Selective polishing for occlusal balance, programmed mandibular advancement trays, the use of fillers and botulinum toxin, the use of "smart" mobile applications for patient awareness and the evaluation of the intensity of the parafunction find their role and indication in reducing the intensity and frequency of bruxism. The specialized literature communicates variable results obtained from the use of the therapeutic techniques listed above. Therefore, the therapeutic decision and the prognosis in the case of patients with bruxism represent a real challenge to the attending physician, further research being necessary in order to establish a rigorous and effective therapeutic protocol.

The finite element method to study the biomechanical effects of the Teuscher activator in class II malocclusion treatment

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Objectives. This study aims to create a three-dimensional (3D) finite element method (FEM) model of the maxilla and teeth of a Class II malocclusion to simulate the effects of the Teuscher type appliance to comprehend the biomechanical effects of stress transmitted to the maxilla and teeth during the treatment.

Material and methods. Based on patient images taken from DICOM (digital imaging and communication in medicine) computed tomography (CT) data, a CAD model of the maxilla with teeth was generated. A 3D model of the recommended Teuscher appliance and facial arch was developed using SolidWorks® software and images from the physical model. In the case of the numerical simulation, a force was applied to each side of the model and at different angles with the occlusal plane to study treatment effects on the Class II malocclusion and optimize the external force orientation.

Results. The goal of generating a biomechanical maxillary model to simulate Class II malocclusion treatment was accomplished. As a main result, the equivalent von-Mises stress on the maxilla was computed leading to evaluate the behavior of the simulated model and the effects of the Teucher appliance.

Conclusions. The results obtained from FEM model allowed a better comprehension of the biomechanics and acquiring essential data regarding the physical aspects involved in the treatment of Class II malocclusion with the Teuscher appliance.

Optical properties of a heated nanofilled composite resin

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Introduction and objectives. To evaluate the color stability of a universal single-shade nanocomposite subjected to different protocols of heating.

Methods. A total group of 56 disks (n=14) (diameter 10 mm, thickness 1 mm) were manufactured from a universal nanocomposite-resin, Omnichroma (Tokuyama): three test groups were obtained after heating the syringes for 1, 5 and respectively 10 times at 45°C , a group was the control.

The disks were polymerized on both sides, immersed (24 h) in distilled water and then in curcumin solution (48 h). The optical characteristics (lightness) L* and color coordinates a* and b* were measured on white, black, and grey background with a spectrophotometer (SpectroShade (MHT), before and after staining. The differences in lightness ΔL*, Δa*, Δb*, as well as color- DE00 and translucencies differences

ΔTP00 have been calculated between: a. control and heated composites and b. non-stained and stained samples.

Results. As result of heating, ΔE00 varied between 1.57- 1.26, ΔL* ranged 1.38-1.00, Δa* -0.61- -0.09, while Δb* between 0.07- -0.15. Mean TP varied between 23.92 – 25.74, with the highest values for T10 group. The color variation, ΔE00, as result of staining ranged between 4.48 – 6.13. decreasing from the control to the T10 group. ΔL* varied between -2.85 and -1.89, Δa* between -1.97 to -1.15 and Δb* between 7.02- 10.19, indicating a decrease in lightness and redness, and increase in yellowness.

Conclusions. The color coordinates varied as result of composite heating and of the staining process, with values that exceed the perceptibility and, in some cases, the acceptability thresholds.

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Evaluation of surface characteristics and cytotoxicity of dental composites

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The purpose of this study was to evaluate the surface and in vitro cytotoxicity on human dysplastic oral keratinocytes (DOK) of four commercial resins-based dental composites commonly used in prosthodontics dental therapies: two indirect composites for crown and bridges—SR Adoro (IvoclarVivadent GmbH) and Solidex (Shofu Dental GmbH); and two dual-curing luting resin cements—RelyxUnicem (3M ESPE Dental Products) and Variolink Esthetic DC (IvoclarVivadentGmbH). A complex assessment of surface characteristics of the four materials was conducted before and after the exposure to artificial saliva through various analyses, such as Scanning Electron Microscopy, Atomic Force Microscopy and Cross Polarized Light Microscopy (PLM). The results showed that DOK viability was not severely affected by exposure to any of these materials; however, Variolink expressed higher values but still above the toxicity level of the rest of the composites. The analysis of the surface structure between initial and artificial saliva exposed specimens returned a compact aspect in both categories and although Variolink and Relyx were subjected to increased roughness after saliva exposure, no damage of the internal compactness was recorded, demonstrating a fair behavior of the luting cements in contact with the saliva.

The impact of COVID-19 on the management strategies in the dental office

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Introduction and objectives. The evaluation of the management measures that dentists have implemented to prevent the spread of SARS-CoV-2 virus infection.

Material and methods. The data were collected using a questionnaire, on a representative, randomized sample consisting of 69 dentists. The questionnaire was anonymous and was completed online using Google Forms. Study participants were informed that completing the questionnaire would mean that the data provided by the answers to the questions would be used for statistical purposes and presented in the dissertation. The questionnaire was disseminated personally, online, by the authors and through Facebook groups dedicated to dentists.

Results. The questionnaire was completed by a total of 69 dentists, of which 54 were women and 15 were men. The number of doctors working in the dental offices evaluated by this study varies between 1 and 16. The most frequent change implemented by the managers of the offices where the doctors who completed the questionnaire work was the implementation of the measures imposed by the legislation for protection against SARS-CoV-2 virus contamination. This measure was applied by 25 of the doctors. Another 7 doctors stated that they had purchased a UV lamp for the office or that they had applied the disinfection measures more strictly, including introducing disinfectant for patients, telephone confirmation of appointments, grouping several maneuvers of the same patient in a single treatment session.

Conclusion. The COVID-19 pandemic has caused numerous changes in the management of dental offices.

Platelet concentrates used in implantology

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Introduction and objectives. Platelet concentrate is a biomaterial with a high potential for bone and soft tissue regeneration without inflammatory reactions and can be used alone or in combination with bone grafts, promoting hemostasis, bone growth and maturation.

Objective. The aim of the study was to determine what types of platelet concentrates are used in implantology and what is their impact on post-extraction bone regeneration.

Material and method. The retrospective study was conducted by searching on PubMed with the terms: PRP- Platelet rich plasma, PRF- Platelet rich fibrin, PRGF - platelet rich growth factor, A-PRF, Bio-PRF and dental implant.

The articles that referred to this type of platelet aggregates in implantology were selected.

Only studies in human subjects related to post-extraction bone regeneration were considered and only randomized controlled trials and controlled clinical trials were included.

Results. The search returned „PRP and dental implant" 206 articles, „PRF and dental implant" 177 articles, „L-PRF and dental implant" 235 articles, „PRGF and dental implant" 54 articles, „A-PRF and dental implant "20 articles, and" Bio-PRF and dental implant "no article.

Nine studies met the inclusion criteria and were considered for analysis. Five studies showed superior results for platelet concentrates for any of the evaluated variables, such as ridge size, bone regeneration, osseointegration process, soft tissue healing. Four studies failed to show a better effect of platelet concentrate compared to intraalveolar clot.

Due to the design heterogeneity of the studies, a meta-analysis could not be performed.

Conclusions. PRFs with its L-PRF variant are the most widely used platelet concentrates in implantology, to date. The analyzed studies present moderate evidence supporting the clinical benefit of platelet concentrates in preserving the post-extraction dimensions of the alveolus.

SATURDAY 6th of November 2021

Session 4

The influence of metal processing technologies on metal-ceramic interfaces

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Introduction and objectives. The aim of this study is the evaluation with Optical Microscope of the metal ceramic interface of metal-ceramic prostheses. The metallic frameworks were made with Selective Laser Sintering (SLS) technology and compared with the ones made through melting-pouring classic technique.

Material and method. For samples manufacturing, we used the NeWay Open Technology Scanner. On the virtual cast the metallic framework with EXOCAD program for SLS and milled wax pattern was designed. STL file was exported into the 3D Phenis PXS Laser Sintering. The patterns for the melting-pouring technology were milled in wax using the Zenotec Select Hybrid. The veneering of Co-Cr metallic frameworks were made with IPS d-SIGN (IvoclarVivadent) ceramic after the oxidation.

The samples were sintered at 9500C-8650C in the Programat P300 (IvoclarVivadent) oven. The samples were cut with a diamante disc, buccal-orally, at the investigated areas connector and pontic.

Results. Optical Microscopy revealed inclusions and dehiscence on the metal-ceramic interface of pour-melted frameworks. Defects of 0.083 mm and 0.127 mm were measured on buccal-oral section of pontics. The aspect of metal-ceramic interface of sintered framework on buccal-orally direction had dehiscence area and in the veneering ceramic were observed spherical inclusions.

Conclusions. The infrastructures made with SLS have multiple advantages: less human errors and technological steps and maintain a constant quality of the prostheses. The errors represented by the detaching of the veneered ceramic are reduced in case of SLS due to the adherence of ceramic whichis higher for SLS metallic infrastructures.

Key words: metal framework, SLS, metal-ceramic interface

Influence of mask wearing on oral habits in a Portuguese school population during COVID-19 pandemic

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Introduction and objectives. The main aim of this study is to evaluate if mask usage, during the COVID- 19 pandemic, influences the reduction of nail biting, object biting and digit sucking. Other objectives consist in determining oral habits prevalence and ascertaining if there is a transference of digit sucking habit in infancy to other habits in adolescence.

Material and method. A sample of 2047 students from the 5th to the 12th grade filled out an online questionnaire. The questions included asked about sociodemographic characteristics, oral habits, and the self- perception of their occurrence before and now with mask usage.

Results. The percentage of nail biters, with mask usage decreased from 44.0% to 11.7% at school ($p < 0.001$) and from 45.7% to 18.0% outside school ($p < 0.001$). Regarding objects biters percentage, it decreased from 44.8% to 7.4% at school ($p < 0.001$) and from 28.6% to 9.8% outside school ($p < 0.001$). The prevalence of nail biting, object biting, and digit sucking were 42.4%, 34.9% and 1.7% respectively. There was a significant association between nail biting, object biting and digit sucking with previous digit sucking at elementary school ($p = 0.008$, $p < 0.001$, $p < 0.001$, respectively).

Conclusions. There was a significant association between mask wearing and frequency reduction of nail biting and object biting. Nail biting was the most frequent habit, followed by object biting and digit sucking. There was an association between digit sucking when entering elementary school with the three studied habits in adolescence.

Optical properties of zirconia crowns fabricated by different techniques

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Introduction and objectives. Translucent zirconia is a modern, innovative ceramic material with improved optical properties indicated to fabricate monolithic all-ceramic restorations. When the esthetic demands of the patients are very high, the virtual design of the monolithic crowns can be altered, and different veneering techniques can be used to improve the appearance.

The aim of this study was to assess the optical properties of zirconia crowns fabricated by different techniques.

Materials and method. Three brands of zirconia ceramics (Katana, Nacera and Cercon) of shade A1 and high translucency, were selected to fabricate forty-five anterior crowns with the final thickness of 1 mm, using three different manufacturing techniques (n=5): a.monolithic, b.cut-back and enamel layering (single layer), c.cut-back and dentine and enamel layering (bilayer). The CIEL*a*b* color parameters of the crowns placed on an ND1 composite die (IPS Natural Die Material Kit), were recorded using the non-contact dental spectrophotometer SpectroShade Micro (MHT Optic Research, Switzerland) in the incisal, middle and cervical areas. The color differences between the types of crowns, tooth areas and zirconia material brands were calculated using CIEDE2000(1:1:1). The data were statistical analyzed.

Results. The fabrication technique affected significantly the L*, a*, b*, C values of the crowns. The highest L*, b* and C values, and the lowest a* were found for the monolithic crowns, while single layer crowns showed the lowest b* and C ($p<0.001$). When compared, the monolithic and bilayer restorations showed the lowest color differences ($\Delta E00<AT$), regardless of the tested areas and zirconia materials. Significantly increased color differences ($\Delta E00>AT$) were achieved between the monolithic and single layer crowns. The lowest L*, a* and b* were found in the incisal area ($p<0.001$), regardless of the material brand. Differences between cervical and middle area were imperceptible, below PT, for all the three types of crowns, except for Nacera single layer crowns, with lightness having the greatest influence. Among all tested materials, Nacera had the highest value for a* and b* parameters, but the lowest values for L* ($p<0.001$), regardless of the fabrication technique. Color differences between Cercon and Katana were the lowest ($\Delta E00<AT$) for all the crown types and areas, with chroma and hue having the greatest influence in the color difference.

Conclusion. The fabrication technique affected the optical properties of anterior zirconia crowns fabricated by different techniques. Monolithic and bilayer crowns showed an acceptable color match. Imperceptible color differences were found between the cervical and middle areas.

The impact of carious disease on the general inflammatory status

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Introduction and objectives. The health of the dental maxillary apparatus can directly impact the general health of individuals. One of the most common affections is represented by the dental caries.

The aim of this study was to evaluate the carious experience in our community and to determine if the carious disease can affect the general health and the inflammation status of the patients.

Material and methods. A number of 200 patients were enrolled in a cross-sectional study of the SALIVAGES project, conducted between 2018 and 2020. The carious diagnosis was established by two independent evaluators according to clinical examination and radiograph examination. The Decayed, Missing, and Filled Teeth index (DMFT) was calculated. The lab analyses were represented by blood count, total lipids, serum inflammatory factors and carbohydrate metabolism markers. Also, anthropometric measurements and associated diseases were encountered on the time of clinical exam. The data were collected and evaluated using Microsoft Excel for Windows and Spearman's Correlation Coefficient.

Results. The mean of DMFT index was 21.28 and annual increment in patient's age, increases the DMFT index significantly ($p<0.001$). DMFT index was correlated significantly and positively with blood glucose ($p=0.040$, $R=0.153$) and patient's age ($p<0.001$, $R=0.288$).

Conclusions. Our population presented a high rate of conditions caused by carious disease; implications of the dental caries on the general health status can be observed.

Aesthetic evaluation of the need for orthodontic treatment – perception among university students

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Introduction. Aesthetics has a relevant part in healthcare procedures, frequently influencing treatment planning embedded with a healthy function. Orthodontic treatment (OT) is often wanted purely for aesthetic reasons. Brook and Shaw (1989) proposed an Index of Orthodontic Treatment Need (IOTN), which has been largely used. This study sought to find the main motivations of university students to look for OT and, based on the Aesthetic Component of the IOTN, weigh the aesthetics influence on it.

Material and methods. In a sample (n=1071) of first-year to final-year students we compared the opinion of the students attending Dentistry, Science and Nature (ScN) and Arts and Humanity (AtH), which was gathered by the University of Porto (Portugal) and the University of Medicine and Pharmacy of Cluj-Napoca (Romania). Participants

responded to an online survey, based on IOTN pictures. The ratings were analysed using the T-Test and alpha error of 5%.

Results. The Dentistry students registered a higher Oral Esthetical Sensibility (OES) than the ScN and AtH students. All groups, except Dentistry Advanced Students, registered a higher OES for Self-Perception than for Perception of Others. Discussion Among other factors, the photos from the IOTN, may have influenced the participants' responses. However, it's one of the most used indexes.

Conclusion. For the studied populations, the main motivations for OT demand are primarily and respectively: functional reasons, doctor's advice, and aesthetic reasons. OES is influenced by Dentistry studies, specifically in Advanced Students. Neither the country of the students' origin, nor the country of graduation influence OES.

Comparative microleakage outcome of different techniques used for creating the occlusal anatomy in class 1 direct restorations

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Introduction and objectives. Microleakage in direct dental restorations is a primary causal factor of the restoration failure. Literature describes several ways to decrease the marginal leakage, focusing on material type, bonding material generation or the placing method of the composite material. The aim of this study was to evaluate whether the technique for occlusal layering of the composite (the use of brush adaptation, the use of magnification, cusp build up, stamp technique) has any effect on microleakage of direct restorations in class 1 cavities.

Material and methods. One hundred extracted molars were restored using five different restoration techniques (Packable Bulk technique [Group A], Occlusal Stamp technique [Group B], Successive Cusp Build-up technique [Group C], Successive Cusp Build-up technique + Brush adaptation [Group D], Successive Cusp Build-up technique + brush adaptation + Dental Operative Microscope magnification [Group E]). The teeth were then subjected to thermal aging for 800 cycles at 5°C and 55°C, infiltrated with basic fuchsin dye for 24h and then sectioned bucco-lingually in the middle of the crown. Infiltration was measured in four areas of the tooth section by five different observers and then given a score from 1 to 3, proportional to infiltration depth.

Results. Lowest mean scores for infiltration (meaning less infiltration observed) were present in Group A (1.41 ± 0.878) and Group C (1.46 ± 0.679), while Group D showed the highest infiltration scores (1.75 ± 0.853). When comparing the groups for differences, no statistically significant difference in infiltration was found between any technique $p< 0.586$.

Conclusion. The techniques examined for placing the occlusal layer of composite in direct restorations do not differ significantly in terms of marginal infiltration, although slight improvement was found when using the bulk technique and the successive cusp build-up. Brush adaptation of composite increments used together with magnification can also aid in providing a tight seal at the Cavo superficial angle of the restoration.

The evaluation of dental adhesives reinforced with magnetic nanoparticles

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Objectives. This study aims to strengthen the bond between the tooth and direct veneers by incorporating magnetic nanoparticles in the adhesive.

Material and methods. This research will present an overview of recent progress in the development of dental adhesives loaded with iron oxide (Fe3O4) nanoparticles incorporated in polymeric shells, which have numerous biomedical applications due to their biocompatibility and their high saturation magnetization. For this study, 5 extracted central incisors were selected and prepared for direct veneering. The samples were organized in two groups before veneering, Group A bonded with normal adhesive and group B bonded with the adhesive mixed with magnetic particles. The samples were analyzed using Stereomicroscopy, Optical Coherence Tomography and Scanning Electron Microscopy.

Results. Recent studies have shown that the magnetic handling of a dental adhesive doped with magnetic nanoparticles improves the adhesion between the composite and the dentin. The methods used for analyzing the samples allowed us to observe the different layers that occur on the surface of the tooth. A reduction of 10 microns of the thickness of the adhesive layer is observed at the samples belonging to group B. Conglomerates of magnetic particles can be seen in the depth of the adhesive layer at the samples from group B.

Conclusions. Under the action of an external magnetic field, magnetic nanoparticles can penetrate deeper into the demineralized structure of the tooth, reducing the thickness of the adhesive layer and, thereby, reducing the probability of microleakage.

Development of an innovative material used in the periodontitis therapy

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Introduction and objectives. The present study's purpose is to develop and characterize a new synthetic biomaterial for the anti-inflammatory stage of the treatment of periodontitis. The new material was produced through electrospinning. This technique involves the creation of a woven synthetic material out of a polymer solution using an electro-hydrodynamic process.

Material and methods. Nine different samples of the material were obtained through electrospinning for the present experiment. The samples were based on polylactic acid (PLA) and contained a mixture of hydroxyapatite (HAP), doxycycline,

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nano-silver or silver nitrate. Scanning electron microscope (SEM) images were obtained for the characterization and measurement of the obtained fibers.

Results. Nine samples were obtained by electrospinning: three samples containing PLA, HAP and doxycycline in three different concentrations (15 g/l, 10 g/l and 7 g/l, respectively); one sample containing PLA, HAP, doxycycline and nano-silver particles; two samples containing PLA, enhanced with silver nitrate or ultraviolet reduced silver nitrate, respectively; one sample containing PLA and HAP; two samples containing pure PLA nanofibers in different concentrations (5% and 8%). The SEM images revealed a smooth, dense, intricate network of PLA fibers obtained through electrospinning. On the surface of the fibres, the HAP and doxycycline can be observed as rough attachments, their size in accordance with the used concentration of the substances.

Conclusion. Electrospinning has proven to be a viable method for obtaining systems that can potentially be used in the treatment of periodontitis. The method allows for replicable results, while being able to produce a wide array of systems, custom to the patients' needs and oral microbiome.

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Microscopic assessment of marginal fit in CAD/CAM crowns

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Introduction and objectives. To investigate the marginal fit of CAD / CAM crowns and to evaluate any gaps at the limit of the abutment-crown.

Material and methods. The standard abutments of the first maxillary molar were obtained from polymer resin by milling with a precise cervical finish line. Three groups of crowns were made from three different materials (n = 6 per group): group E (IPS Empress CAD, Ivoclar Vivadent), group C (Cerasmart, GC) and group G (G-CAM, Graphenano Dental), each of these groups was further divided into subgroups based on the abutment reduction during the preparation. Each crown was cemented on the abutment with G-CEM Link Force cement (GC). The samples were studied under a scanning electron microscope (Jeol JSM 25S, Japan) using 45X, 100X, 450X magnifications and morphometric analysis was performed using Cell D morphometry software (Olympus Soft Imaging Solutions GmbH, Münster, Germany).

Results. No significant differences were observed for the marginal adaptation between groups C and E. However, there were significant differences in group G compared to the other groups, as the most inappropriate marginal fit was found in group G, with gaps at all vestibular surfaces. The highest value of the gap was observed in group E and the highest values of the marginal discrepancy appeared in group C.

Conclusions. In-vitro microscopic variations were observed in the marginal fit for the CAD/CAM crowns investigated, but these are within acceptable clinical limits. The knowledge of these marginal discrepancies could be useful to predict successful prosthetic restorations in clinical practice.

Evaluation of marginal adaptation and finishing of class V fillings

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Introduction and objectives. Composite Resins are polymeric materials with various indication in dentistry. The high aesthetics, chemical adhesion to dental hard tissues, along with mechanical and optical properties makes them the elective materials for tooth restoration. The objective of this in vitro study is to evaluate the marginal adaptation and polishing of two composite resins used for restoring class V cavities.

Material and method. On the buccal surface of twenty extracted human teeth were prepared class V cavities -4 mm mesio-distal width, 3 mm occluso-gingival width, 1.5 mm depth. The GC-Essentia (GC) and Evetric (Ivoclar Vivadent) composite resins were used for filling the cavities following the standard protocol and recommended adhesive system. Have Transparent Cervical Matrix (Kerr) were used to restored half on the samples. The teeth were divided into four groups. Group 1-Essentia GC without matrix, group 2 Essentia GC and matrix, group 3 Evetric, without matrix, group 4 Evetric, with matrix. The fillings were polished with dedicated discs, rubbers and paste. The samples were investigated with Optical Microscope.

Results. The investigations made with the Optical Microscope spotted small differences between the samples restored by hand and the ones restored with the matrix. The size of the defects at the surface of the interface are acceptable. The polished composite surfaces of groups 2 and 4 were smoothers.

Conclusions. There were no significant differences between groups. Group 2 and 4 but noticeable differences between the samples restored by hand and the ones with the matrix.

Key words: matrix, composite, optic microscope

Antimicrobial effect of photodynamic therapy evaluated by SEM: a pilot study

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Photodynamic therapy has a wide applicability in dentistry, noting the antimicrobial effect it exerts on bacteria, even those organized in biofilms. The mechanism of action involves the interaction between a specific photosensitizer fixed to the bacterial cell and laser light, which results in lysis of the cell.

In this study, extracted human teeth were used, prosthetically prepared at depths that affected both the enamel and the dentin. The teeth were contaminated with Streptococcus mutans and subjected to SEM evaluation before and after photodynamic therapy.

The antibacterial effect on the formed biofilm was highlighted by reducing the number of bacteria in the dental hard tissues after photodynamic therapy. This method of disinfection can be an effective way to eradicate the bacterial factor, the main cause of recurrence or failure of dental treatments.

The effect of operative stress on the glycemia variations in the dental practice

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Introduction and objectives. The aim of this study was the evaluation of the glycemia variations in correlation with the anxiety items and the dental maneuvers.

Material and method. The study included 30 patients, over 18 years old and the following demographic indicators were registered: gender, age and general health status. A standardized questionnaire called „STAI" (State Trai Anxiety Invetory) was used in order to determine stress and anxiety levels, created by Charles D. Spielberg. Two types of questionnaires were applied: questionnaire X1 which evaluates anxiety as a state and X2 which evaluates anxiety as a characteristic of the individual. Glycemia levels were registered pre-operative (G1), intra-operative (G2) and post-operative (G3) by using a glucose meter (SD Codefree), indicated for monitoring glucose levels from fresh capillary blood. Both descriptive and statistical analysis were conducted using Microsoft Excel and RS Studio.

Results. The minimally invasive dental procedures were the most frequently performed in the study group, and of these the most frequent being the coronary filling. In 2/3 of the patients the G3 values were higher than G1, but in 1/3 of the patients the results were the opposite. The X1 score of stress had a significant influence on the pre-operative glycemia levels. Female patients registered lower blood glucose levels in comparison to the male patients.

Conclusion. The X1 stress score influences the blood sugar value more than the X2 stress score. Not all dental procedures resulted in increases of G2 and/or G3 values.

Laboratory study of the mechanical behavior of stainless steel, TMA, and GumMetal

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Introduction and objectives. To have a predictable orthodontic movement, it is necessary to know the force system that acts in it. The use of space-closing springs allows better control of the system, which varies depending on geometry, section, and material. The attractive properties of the recent Gum Metal alloy make it interesting for orthodontics.

The purpose of this investigation was to compare the force system of three metal alloys: stainless steel, TMA® (beta-titanium metal alloy), and the new GumMetal®.

Material and method. For this purpose, space-closing springs in L were made in the referred materials, a force of 100 and 200 g was applied to the system, and the activation value and the moment were measured, with an inter-bracket distance of 12 mm. The moment/force ratio was also subsequently calculated. For both steel and TMA® alloys, the 0.016" x 0.022" and 0.017" x 0.025" sections were used. For GumMetal® only

the 0.017" x 0.022" section was used. The sample was composed of 80 springs, 16 for each metal alloy/section. Statistical analysis was performed using Analysis of Variance (ANOVA), followed by Tukey HSD multiple comparison tests.

Results. The results allowed us to conclude that there are statistically significant differences ($p<0.001$) between the three materials (stainless steel, TMA®, and GumMetal®) in terms of the activation value, moment, and moment/force ratio. The values of moment/force ratio varied between all ranged between 4.63 and 6.93 mm.

Conclusions. The material that presented the best mechanical characteristics was the GumMetal® of section 0.017" x 0.022".

Chairside CAD-CAM milling materials - optical properties assessment after exposure to cigarette smoke

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Introduction. For the esthetic rehabilitation of prosthetic patients, using chairside CAD-CAM milling materials are becoming nowadays one of the main options. Choosing the right restoration material for a smoker patient could be a challenging task.

The objective of the study was to evaluate the influence of cigarette smoking on the optical properties of a group of CAD-CAM milling materials.

Materials and method. Samples of 1 mm thickness (n=10) of two different CAD-CAM milling materials: composite resin (Brilliant Coltene - BC) and feldspar ceramic (Vita Mark II- VM) (A2 Shade) were used for an in vitro study. The smoke of 1, 10, and respectfully 100 cigarettes was aspirated inside a sealed cabin to mimic the act of smoking, and interacted with the exposed samples. The lightness (L*), and color coordinates (a* and b*) of each sample were measured before and after each exposure, using a dental spectrophotometer (Vita Easyshade Advanced 4.0). The color difference ΔE_{00} and the whiteness index for dentistry (WI_D) based on CIELAB color space was calculated, and the data were statistically analyzed and compared with the thresholds of perceptibility and acceptability for the ΔE_{00} (PT_{00}=0.8, AT_{00}=1.8), and for the WI_D (WPT=0.7 respectively WAT=2.6).

Results. The color differences after the exposure to the smoke of 1, 10, and 100 cigarettes were ΔE_{00} = 0.4, 2.6, and respectively 15.5 units for BC and ΔE_{00} =0.2, 2.6 and respectively 12.4 units for VM. Even after 10 cigarettes, PT and AT have been exceeded. The values of WI_D after the exposure to the smoke of 100 cigarettes decreased from -0,75 to -42.8 units (BC) and from 24.9 to -23.0 units (VM), exceeding the WPT and the WAT thresholds. The whiteness index difference between the initial and the final situation was ΔWI_D = -34 units (BC) and ΔWI_D = -48 units (VM).

Conclusion. The optical properties of the two CAD-CAM milling materials varied due to the exposure to smoke, with the color becoming darker, reddish, yellowish (decreasing of L*, increasing of a* and b*).

Key words: CAD-CAM, cigarette, smoke, optical properties

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E-POSTER PRESENTATIONS

Effects of occlusal overloads on teeth

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Introduction and objectives. Occlusal overloads have several effects on teeth, including abfraction-type non carious cervical lesions, cracks and fractures of tooth crown and dental restorative materials fractures, and also vertical root fractures. The most serious are vertical root fractures because they often lead to tooth extraction. In addition to occlusal overloads, their causes include other factors, such as: the anatomy of the tooth, the type of root preparation and the type of dental restoration. As it is recognized that the Sars-Cov2 virus pandemic has led to an increase in stress and anxiety among the population, as well as dental anxiety, the question as to whether this has resulted in an increase in the number of cases of coronary root fractures as a result. of increasing occlusal overload is important.

Objective. The aim of the study was to determine the incidence of vertical root fractures during the pandemic (March 2020-March 2021) compared to the previous period (March 2019-March 2020).

Material and method. The retrospective study was performed in a private dental clinic, selecting cases from patients presented between March 15, 2019 - March 15, 2021 all the cases with vertical root fractures presented for diagnosis and treatment. Statistical analysis was performed using Microsoft Excel software.

Results. Out of the total of 2581 visits, 1534 were in the period March 15, 2019 - March 15, 2020, and 1047 in the period March 16, 2020 - March 15, 2021, the number of visits decreasing by 20.25% in the pandemic. During the pandemic, the number of vertical root fractures doubled, increasing from 8 to 16. The affected teeth were the maxillary premolars and the permanent first molars both mandibular and maxillary. In most cases, the indication for treatment was extraction.

Conclusions. Occlusal overloads were accentuated in the pandemic, the number of cases with vertical root fractures presented at the dental office for diagnosis and treatment being double compared to the previous period.

Key words: vertical root fractures, occlusal overloads

Optical features evolution of CAD-CAM milling materials

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Introduction and objectives. In the last 30 years, CAD-CAM milling materials improved considerably. In addition to mechanical properties, adhesion and surface characteristic, the optical features are some of the most important things that have evolved.

The objective of the study was to highlight the evolution of the color availability of CAD-CAM milling material.

Materials and method. An internet search was performed for a number of 35 most frequently used CAD-CAM milling materials regarding their optical features. The color availability (shade, translucency, opalescence, fluorescence) was investigated and recorded.

Results. If at first monochromatic materials were used, later the aesthetic properties were improved with multilayer variants and multiple translucency and opalescence levels.

Conclusion. In the limitation of this study, there is an evolution of the optical features of all the classes of CAD-CAM milling materials.

Key words: CAD-CAM, ceramic, color, milling materials.

The benefits of full digital workflow from intraoral scanning to final restoration

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Introduction and objectives. Statement of problem: at present, in the field of dentistry, there is a lot of discussion about the digitization of the workflow in terms of replacing the classic impression with the digital impression by using intraoral scanning. Therefore, various studies have been performed, and still are, to find out if from a clinical point of view, the accuracy of intraoral scanning is really a solution in making dental prostheses.

Purpose. In this study we aimed to evaluate the reliability of an intraoral scanning procedure, followed by performing the dental crown, initially temporary from PMMA, then the final one from Multilayer Monolithic Zirconia.

Material and methods. In our study we had a patient who, following the treatment plan, requireds a prosthesis in the premolar 2.5. The digital impression was taken with the Medit i500 intraoral scanner. The digital design was made in Exocad exclusively on the intraoral impression. The temporary crown was made by milling in a PMMA disc and by 3D printing from a composite resin with certification for medical use, in order to observe the possible differences between milling and 3D printing, and the milling of the final crown in a disc of Multilayer Zirconia from VITA.

Results. The adaptation in the oral cavity of the patient was clinically appreciated as being very good both in terms of the adaptation of the crown to the collet and in relation to the adjacent teeth. The restoration required only a small occlusal adjustment, but the subsequent analysis showed that it was not a problem of scanning, but only of the parameters in the design software that could be modified, which allowed to obtain superior results in the final crown of Zirconia. After a month, the temporary crown was replaced by the final Multilayer Zirconia Crown, using the initial scan.

Conclusions. From our point of view, intraoral scanning becomes a solution and can successfully replace the classic impression, especially since today's scanners not only bring the benefit of impression accuracy, but come with a number of functions that significantly improve communication and collaboration between the dental office and the dental laboratory.

Cerec Smile Design

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Introduction and objectives. Digital Smile Design is a current tool used to make a diagnosis, facilitate the communication with the patient and preview the final result. A limited dental view is not always enough to make an aesthetic integration of a dental rehabilitation, a facial view being necessary.

The objectives of the study were to evaluate the advantages and the improvements of Cerec Smile Design.

Materials and method. A digital smile design software (Cerec Smile Design-Densply Sirona) was used to resolve a previsualization of a clinical case. Dental and facial photos were introduced in the software to analyse and simulate the smile, to measure and analyze the proportions of the teeth and the soft tissues.

Results. Cerec Smile Design shows improvements over the alternative design programs in terms of speed, fidelity and reliability. The program is user friendly and offers a wide range of tools that give the clinician the opportunity to obtain rapidly aesthetic results.

Conclusion. In the limitation of the study, Cerec Smile Design facilitate the aesthetic dental rehabilitation using a facial approach to the dental one.

Key words: digital, smile, design, aesthetic.

Preliminary study regarding the use of printing technology for creating a metal-free dental space maintainer

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Introduction and objectives. The aim of this study is to develop a high-precision aesthetic dental space maintainer using computer-aided design (CAD) / computer-aided manufacturing (CAM) and 3D printing by resin-based additive technique.

Methods. At first, a virtual model of a dental space maintainer achieved through a 3D software was purchased. All samples were printed by three diffrent technologies SLS (Selective Laser Sintering), FDM (Fused Deposition Modelling) and SLA (Stereolithography) using the same stl-file. For the manufacture of all devices was used a biocompatible material. After design adjustments were made, four samples were performed by SLA printing technology and subsequently subjected to mechanical strength test.

Results. Macro perspective shows a higher accuracy of the devices made by SLS and SLA compared to FDM where the printing was not successful, obtaining some deformed samples, resulting in a single viable sample. All devices obtained by SLA

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were easily processed developing a smoother surface. According to the space maintainer design, the first one would have adequate mechanical properties only if it is made of high strength material such as metal, but the second one was acceptable in a metal-free sample.

Conclusion. 3D printing offers the possibility to manufacture an aesthetic dental space maintainer device but the mechanical properties are closely related to the object design.

Key words: space maintainer, CAD/CAM, 3D printing

Factors that influence the need of orthodontic treatment - perception among university students

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Introduction and objectives. The present study aims to know what the main motivations for university students are to seek OT and their critical appreciation of OT need.

Material and methods. The sample of this study consisted of 802 university students from University of Porto and the 7 Portuguese Dentistry Schools – 461 attending the First year and 341 attending the Last year of their course.

The inquiry was based on the 10 photos of the Aesthetic Component (AC) of the IOTN with different necessity levels of OT: level 1 (OT is not needed) to 10 (definitely needs OT). Participants rated them considering two perspectives: "their own mouth" and "somebody else´s mouth."

To know the main motivation of university students to seek for OT among clinical indication, aesthetics, functional reasons and fashion, they were asked to rate them in a scale from 1 (doesn't influence me) to 5 (definitely influences me).

Results/Conclusions. The results indicated that the main reasons to seek for OT were clinical indication and functional reasons. When comparing perception of OT need in the point of view of "own mouth" and "other people's mouth", students in general tended to overemphasize the need for OT for themselves. When rating the photos, Dentistry Students overestimated the need for OT compared with Other students, being Last year Dentistry Students the most demanding. Students who are "doing/have done/want to do OT" also overestimated the need of OT. Gender and age didn't influence the perception of OT need.

The impression guide – a new tool designed for better dental impressions

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Introduction and objectives. The aim of this study is to analyze the dimensional stability of final impressions made with different impression materials. The novelty of the study is the creation of a printed impression guide. It was designed to help the dentist. It verifies the parallelism between the abutments, to highlight the finish line of the preparation by using the pressure it exerts on the free gum. It also adds additional dimensional stability to the impression material.

Materials and method. The design of this device is similar to the metal skeleton of a fixed metal-ceramic prosthetic restoration, having a cylindrical-conical shape, while respecting the shape of the dental abutment preparation, as well as the completion of the cervical preparation.

For this study were required 3 types of impression materials: alginate, silicone with condensation reaction (with two consistencies: light and putty) and polyether.

Two study models were chosen that presented third-class edentation and prepared abutments, with a chamfer finish line. The model was scanned and the dental technician designed the impression guides for the 2 models. The impressions were then made for each material and analyzed using a digital caliper.

Results. Significant improvement was observed in the probes using the dental impression guide.

Conclusions. The classical impression materials need improvements in the dimensional stability and are more accurate using the dental impression guide.

Key words: dental impression, impression guide, chamfer finish line, impression materials.

Two-years evaluation of clinical and radiological changes in the case of periapical lesions - Clinical Trial

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Objectives. The main reason for this study is to clinically and radiologically analyze the results of endodontic retreatment in the case of a tooth with periapical lesions and massive coronal destruction, as well as the effectiveness of endodontic intracanal medication.

Materials and methods. Ten patients, who required RCT (root canal treatment) for several teeth treated in the past, with periapical lesions and symptoms of endodontic origin, have been selected for this study. Endodontic treatment was performed according to a standardized protocol. After the removal of carious lesions and the old endodontic treatments, in the case of pluriradicular teeth, the main interest was to highlight undiscovered and untreated secondary canals, using an endodontic microscope. After the chemomechanical preparation, all teeth were sealed for two weeks with intracanal antibiotic medication. Radiological examinations were performed before, during and after endodontic treatment, as well as after a period of 6, 12 and 24 months for each tooth.

Results. The main cause for the appearance of periapical lesions after an endodontic treatment is the insufficient instrumentation of the root canal, from a mechanical and chemical point of view, but also the failure to detect all the root canals not knowing the anatomy of the tooth.

Conclusions. One year following the treatment, all of the patients came back without any kind of pain or swelling. The radio-transparency areas observed on X-rays at the beginning of the treatments, diagnosed as periapical lesions, have significantly decreased at the one year follow up.

Key words: endodontic retreatment, periapical lesion, radiology

Image processing techniques to optical coherence tomography images of adhesive interfaces

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Introduction and objectives. Optical coherence tomography (OCT) imaging can be used to image the adhesive surface between tooth structure and bonded veneers. Limitations of OCT imaging arise from the noise that degrade the image quality. The aim of this study is to determine if image processing techniques are useful in OCT image analysis.

Materials and methods. OCT scans of the interface between tooth surface and bonded veneers were made using an OCT system working in Time Domain mode at 1300 nm. Images processing techniques (contrast enhancement and image sharpening) were applied to the OCT images using Matlab software.

Results. The image processing techniques used in this study are useful in reducing noise, improving the quality, and allowing for better evaluation and image analysis of the adhesive interface.

Conclusion. OCT images combined with image processing techniques are useful in the evaluation of adhesive interfaces between tooth structure and veneers.

The road to sustainability in dentistry. Is the reuse of sterilization sleeves viable?

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Introduction and objectives. This study aims to test the safety and efficacy of reusing sterilization sleeves without compromising their aseptic environment.

Materials and methods. 27 samples of paper/plastic sterilization sleeves were tested in this work and divided into 3 groups (experimental group - reused sleeves; negative control group - new sleeves; and a positive control group - samples exposed to environmental contamination). The experimental group consists of sleeves that were opened and a gauze was inserted in them, and then closed and sterilized again, thus representing the reuse of the sleeves. All samples were stored in the same place, in open environment, for 1 day (T0), 7 days (T1) and 31 days (T2). After each storage period, the sleeves were opened and the gauzes removed aseptically and incubated in Nutrient Agar medium at 37°C for 3 days. After the incubation period, the plates were inspected and microbial contamination classified as present or absent. This assay was done in triplicate and at three different times, adding up to a total of 81 samples analyzed.

Results. Observation of the petri dishes of the experimental group and the negative control group showed absence of contamination. The positive control group showed extensive contamination.

Conclusion. This study shows that sterilization sleeves can be used a second time, maintaining their sterility and integrity conditions even over long periods of time (up to 31 days - 1 month storage) even when stored in open environment.

Real efficiency of sodium hypoclorite in dissolution of vital and necrotic pulp tissue

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Introduction. Due to the complexity of the endodontic system, mechanical instrumentation fails to completely remove the remnants of pulp tissue. Sodium hypochlorite (NaClO) is the most widespread and popular endodontic disinfectant, but also the only irrigant which can effectively dissolve pulp tissue residues and dentinal collagen.

Objectives. The aim of the study is NaClO's real ability, in different concentrations and temperatures, to dissolve vital and necrotic pulpal tissues.

Material and method. The present study involved the clinical sampling of vital and necrotic pulpal tissues and placing them in equal amounts of 2% and 5.25%

NaClO solutions at room temperature ambient (23°C) and heated to 60°C afterwards monitoring their complete dissolution times.

Results. The fastest dissolution time (7 min. 24 sec.) was observed in the case of group 4 (5.25% NaClO at 60°C), and the slowest dissolution time (26 min. 03 sec.) was observed in the case of group 1 (2% NaClO at 23°C), both on samples of vital pulp tissue. As far as the type of dissolved pulpal tissue (vital or necrotic) is concerned, no differences were found between solutions of the same concentrations at ambient temperature.

Conclusions. This study reconfirms that endodontically used NaClO (2% and 5.25%) dissolves complete both vital and necrotic pulpal tissue in a relatively short time. Both the increase in concentration and the heating of the irrigation solution increase its dissolution capacity in direct proportion and consequently decrease the waiting times for a complete dissolution of organic matter inside the root canal.

Key words: sodium hypochlorite, pulp tissue dissolution