IOCPr 2025 Conference

The 1st International Online Conference on Prosthesis

10–12 December 2025 | Online

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The 1st International Online Conference on Prosthesis

10–12 December 2025 | Online

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Welcome from the Chair

Dear Colleagues,

The 1st International Online Conference of *Prosthesis* (ISSN: 2673-1592, Impact Factor: 4.5) focusing on the "State of the Art and Future Perspectives on Dental Prosthesis" will be held from **10 to 12 December 2025**. The main purpose of the conference is to promote the use of recent advances in all dental prosthesis issues, address challenging problems, share the latest scientific innovations, and shape the future of dental implant prosthodontics-related technologies and processes.

This conference is an excellent opportunity for prosthodontics and dental implant researchers and scientists to interact, communicate with colleagues, learn from each other, share ideas and experiences, jointly solve problems, and suggest alternative solutions for a better future in the prosthodontics field. A distinct advantage of this virtual international conference is that participants are not required to travel and can simply attend the conference regardless of their location. Participants do not need to seek financial support for travel, nor do they need to leave the comfort of their home, office, and/or family to book a trip and, consequently, adjust to the corresponding time zone.

In this virtual conference setting, while presenters can deliver live and pre-recorded presentations simultaneously, participants can contribute to the discussion and provide feedback orally and/or using the "Chat" and "Reaction" functions. The main topics of this conference will cover the following:

1. Dental Prosthesis;
2. Dental Materials;
3. Dental Implants and Prosthodontics;
4. Digital Dentistry and Dental Implants;
5. AI, Robotics and Digital Tools Applied to Dental Prosthesis.

All accepted abstracts will be published on the conference's website. Participants are asked to submit an abstract of 200 to 300 words and refer to the abstract preparation guidelines in "Instructions for Authors" for more information.

Following the conference, participants may submit a full paper to MDPI's *Prosthesis* journal. After the review process, authors of the accepted papers will receive a **20% discount** on the APC before the paper is published in *Prosthesis*.

On behalf of the Organizing Committee, I welcome your attendance at the first International Online Conference of *Prosthesis* on the "State of the Art and Future Perspectives on Dental Prosthesis".

Prof. Dr. Marco Cicciu
Department of General Surgery
and Surgical-Medical Specialties,
University of Catania, Italy

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Prosthesis (ISSN 2673-1592) is an international, peer-reviewed, and open access journal that provides an advanced forum on rehabilitation medicine. The primary purpose of this scientific journal is to provide an interdisciplinary approach to the field of medicine, reach an audience related to medicine and rehabilitation procedures, and also to report on everything related to physics, mathematics, engineering, and materials science. We welcome original research articles, reviews, communications, and case reports, as well as Special Issues on particular subjects.

The aim of *Prosthesis* is to encourage scientists to publish their experimental and theoretical results in as much detail as possible. Therefore, the journal has no restriction on the maximum length of the papers. Full experimental details should be provided so that the results can be reproduced.

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Dr. Gennaro Ruggiero

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Genoa University, Genoa, Italy

Prof. Dr. Yilmaz Umut Aslan

Institute of Odontology, Vilnius University, Vilnius, Lithuania

Dr. Guido Picciocchi

Department of Prosthodontics, Marmara University, Istanbul, Turkey

Program Overview of IOCPr 2025

	Day 1	Day 2	Day 3
Morning	**Welcome and Opening Remarks** Event Chair (10:30 CET | 04:30 EST | 17:30 CST) **Session 1.** Dental Restorative Materials in Prosthodontics **Keynote and Invited Talks** **Contributed Oral Presentations**	**Session 2.** Digital Technologies and Artificial Intelligence in Prosthodontics **(Part 1)** **Keynote and Invited Talks** (09:00 CET | 03:00 EST | 16:00 CST)	**Session 3.** Innovations and Challenges in Dental Implants **Keynote and Invited Talks** **Contributed Oral Presentations** (09:00 CET| 03:00 EST| 16:00 CST)
Afternoon	**Flash Poster Presentations** (14:00 CET | 08:00 EST | 21:00 CST)	**Session 2.** Digital Technologies and Artificial Intelligence in Prosthodontics **(Part 2)** **Contributed Oral Presentations** (14:00 CET | 08:00 EST | 21:00 CST)	

*** CET—**Central European Time
EST—Eastern Standard Time
CST—China Standard Time

IOCPr 2025 Program

10th December 2025 (Wednesday)

Session 1. Dental Restorative Materials in Prosthodontics

10:30 (CET, Basel) | 04:30 (EST, New York) | 17:30 (CST Asia, Beijing)

Time in CET	Speaker	Title
10:30–10:40	Prof. Dr. Marco Cicciu Welcome and Opening Remarks	
10:40–10:50	Prof. Dr. Marco Ferrari Assoc. Prof. Andrea Scribante Welcome by Session Chairs	
10:50–11:10	**Dr. Andrea Fabianelli** Invited Speaker	Palatal veneer as a valid tool in restorative dentistry
11:10–11:25	**Maria Gabriela Packaeser de Souza** Selected Speaker	Economic and Environmental Evaluation of 3D Printing in Restorative Dentistry: A Scoping Review
11:25–11:40	**Yosra Gassara** Selected Speaker	Less is More: The Impact of Minimally Invasive Posterior Restorations
11:40–11:55	**Ahila Singaravel Chidambaranathan** Selected Speaker	Incorporation of nanoparticles into the thermal behavior of polycarbonate resin: A systematic review
11:55–12:10	**Athina Niakou** Selected Speaker	Cast Gold vs. Fiber Post-and-Core in Restoring Severely Compromised Mandibular Molars: A 3D-Finite Element Analysis
12:10–12:25	**Rim kallala** Selected Speaker	Posterior Mini-Invasive Restorations: The Dilemma of Material Choice
12:25–12:40	**Malek Abidi** Selected Speaker	Adhesive Cementation of Lithium Disilicate Versus Zirconia Materials: Study of 2 Case Reports
12:40–12:55	**Beatriz de Camargo Poker** Selected Speaker	What is the effect of brushing and immersion in hygiene solutions on the roughness of 3D Printed resins for base and teeth dentures?
12:55–13:10	**Fabio Andretti** Selected Speaker	Minimally Invasive Management of Traumatized Maxillary Incisors
13:10–13:40	**Dr. Julfikar Haider** Keynote Speaker	3D printing of nanocomposites for denture
13:40–14:00	**Break**	**Break**

Flash Poster Session

14:00 (CET, Basel) | 08:00 (EST, New York) | 21:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
14:00–14:05	**Oana Elena Burlacu Vatamanu** Poster Presenter	3D Facial Imaging: A Comparative Study of Modern Scanning Techniques
14:05–14:10	**Roldan Castro Hernandez** Poster Presenter	SUSTAINABLE 3D PRINTING : OPTIMIZING WASTE REDUCTION AND RECYCLING
14:10–14:15	**TBA** Poster Presenter	TBA
14:15–14:20	**Neada Hysenaj** Poster Presenter	OCCLUSAL SPLINTS THICKNESS IN THE TREATMENT OF TEMPOROMANDIBULAR DISORDERS, REVIEW OF CURRENT EVIDENCE.
14:20–14:25	**TBA** Poster Presenter	TBA

14:25–14:30	**Antonio Barbarisi** Poster Presenter	Microbiological study using phase-contrast microscopy for the disinfection of complete dentures anchored to ball-attachment implants
14:30–14:35	**Sherine Philip** Poster Presenter	The Effect of Surface Modifications on the Biocompatibility of PEEK Dental Implant Material
14:35–14:40	**Carlos Domínguez Vargas** Poster Presenter	Psychosomatic Bruxism and Dental Implant Complications
14:40–14:45	**Haseeb H. AlDary** Poster Presenter	Patent-Based Socket-Shield Technique Utilizing Bone Trephine: A Case Series
14:45–14:50	**Inesa Stonkutė** Poster Presenter	Systematic Review of CAD/CAM-Fabricated Customized Healing Abutments and Their Effect on Soft Tissue Esthetics
14:50–14:55	**Hend Mohamed ElSayed** Poster Presenter	An In Vitro Acidic Media Simulation of GERD And Its Effect on Machine-Milled Ceramics' Optical Properties
14:55–15:00	**Jyothi Venkat Sainath** Poster Presenter	Prosthetic rehabilitation of velopharyngeal insufficiency in a patient with locally advanced carcinoma oropharynx: a case report

11th December 2025 (Thursday)

Session 2. Digital Technologies and Artificial Intelligence in Prosthodontics (Part 1)

Time: 9:00 (CET, Basel) / 03:00 (EST, New York) / 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
9:00–9:10	Prof. Dr. Fernando Zarone Prof. Dr. Roberto Sorrentino Welcome from the Session Chair	
9:10–9:30	**Prof. Dr. Umut Aslan** Invited Speaker	All on X prosthesis: A journey from analogue to digital
9:30–10:00	**Prof. Dr. Marco Tallarico** Keynote Speaker	Where ART Meets Intelligence: AI and the Future of Veneer Aesthetics
10:00–10:30	**Prof. Dr. Roberto Lo Giudice** Keynote Speaker	The precision in dentistry: AI and digital technologies
10:30–10:50	**Prof. Dr. Ieva Gendviliene** Invited Speaker	Artificial Intelligence in Digital Implant Prosthodontics: Toward More Predictable Workflows
10:50–11:10	**Dr. Gennaro Ruggiero** Invited Speaker	Digital workflow in prosthodontics: New paradigms and smart solutions for effective simplification
11:10–14:00	**Break**	**Break**

Session 2. Digital Technologies and Artificial Intelligence in Prosthodontics (Part 2)

Time: 14:00 (CET, Basel) / 8:00 (EST, New York) / 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
14:00–14:15	**Ruben Maria Paino** Selected Speaker	Digital Implant-Prosthetic Protocol of Maxillary Lateral Incisor Agenesis: A 4-Year Clinical Assessment of Soft Tissue Integration and Biomaterial Compatibility
14:15–14:30	**Mariam Shawkat** Selected Speaker	A revolution in dentistry: AI-powered 3D scanning and printing system for custom prosthetics, implants, and orthodontics using Palano-enhanced implants
14:30–14:45	**Nesrine Slimene** Selected Speaker	Clinical Application of Photogrammetry in Mandibular Full-Arch Immediate Implant Rehabilitation: A Case Report
14:45–15:00	**Corina Marilena Cristache** Selected Speaker	A Full Digital Workflow for Immediate Removable Denture Fabrication and Overdenture Rehabilitation in Elderly Patients: A Proof of Concept for Maxilla and Mandible
15:00–15:15	**Annamaria Mastrosimone** Selected Speaker	12 Month Clinical Evaluation of an Innovative Digital Index for the Follow-Up of Edentulous Patients
15:15–15:30	**Giulia de Durante** Selected Speaker	Comparative in vitro study of the marginal fit of 3D-printed nanocomposite crowns with horizontal and vertical preparation geometries
15:30–15:45	**Zhouyu Ding** Selected Speaker	DTX Studio Integrated with Exocad for Precise Esthetic Crown Lengthening and Veneers
15:45–16:00	**Clarissa Esposito** Selected Speaker	Effect of Clinical Experience on Acquisition Time and Chairside CAD Design Accuracy: An In Vitro Study

12th December 2025 (Friday)

Session 3. Innovations and Challenges in Dental Implants

9:00 (CET, Basel) | 03:00 (EST, New York) | 16:00 (CST Asia, Beijing)

Time in CET	Speaker	Title
9:00–9:10	Prof. Dr. Ana Messias Welcome by Session Chair	
9:10–9:40	**Prof. Dr. Luca Fiorillo** Keynote Speaker	Peri-implantitis: Etiopathogenesis, Risk Stratification, and Evidence-Based Management Pathways
9:40–10:10	**Prof. Dr. Gabriele Cervino** Keynote Speaker	Biomechanical Complications in Implant-Supported Prosthodontics: Evidence from Finite Element Analysis and Published Studies
10:10–10:30	**Dr. Guido Picciocchi** Invited Speaker	TBA
10:30–10:45	**Abdulkareem Alotaibi** Selected Speaker	Structural, Mechanical, and Biological Characterization of Polycaprolactone (PCL) Scaffolds for Dynamic Cell Cultures, Toward Dental Applications
10:45–11:00	**Mohamed Aissi** Selected Speaker	Innovative Ag–CaP–ZrO_2 Coatings on Ti6Al4V: A Multifunctional Strategy to Improve the Durability of Dental Implants
11:00–11:15	**Jialing Sun** Selected Speaker	Targeted delivery of miR-210 rosuvastatin in the treatment of periodontitis
11:15–11:30	**Mohammed Samir** Selected Speaker	Internal Sinus Elevation with Osseodensification and i-PRF Sticky Bone Graft: A Case Report
11:30–11:45	**Yash Desai** Selected Speaker	Evaluating the Effects of Mechanical and Electrical Stimuli on Osteoblast Mineralization in Dynamic Cell Cultures
11:45–11:55	**Prof. Dr. Marco Cicciu** Event Chair	**Closing Speech**

Session 1. Dental Restorative Materials in Prosthodontics

sciforum-149376: An In Vitro Acidic Media Simulation of GERD And Its Effect on Machine-Milled Ceramics' Optical Properties

Hend Mohamed El Sayed [1,2]

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[2] Conservative dentistry department college of dentistry, Cairo university, Giza, Egypt

Introduction: This study will focus on how the color and translucency of indirect computer-aided design and computer-aided milling (CAD/CAM) ceramic restorations are affected by gastric acid, like erosive solution exposure.

Methodology: Four types of CAD/CAM ceramic materials were grouped as follows: group Z, Ceramill Zolid Gen-x white (Austria); group E, IPS e.max CAD HT A3 (Ivoclar Vivadent); group S, Vita Suprinity PC A3 (Germany); and group C, Cerasmart 270 A3 (Japan). Forty disks were milled from the four ceramic materials, with tendisks per group. Each disk was prepared to a thickness of 10 mm. All specimens were immersed in a mimicked gastric-like acidic solution (to resemble what takes place in the case of GERD). A spectrophotometer was used to detect the color difference ΔE, which represented the color shift before and after acid immersion. Translucency parameter (TP) numerical values were collected.

Results: The findings revealed a statistically significant difference (P 0.05) among the groups. Group C (Cerasmart 270) exhibited the most important color change and the least color stability, followed by groups E (IPS e.max) and S (Vita Suprinity). In contrast, group Z (Ceramil Zolid) showed the least color change and the best color stability. After immersion in a gastric-like acidic solution, each ceramic material's translucency parameter (TP) exhibited a statistically significant difference ($P < 0.05$). Only group C (Cerasmart 270) experienced a substantial loss in translucency, while groups Z (Ceramil Zolid), E (IPS e.max), and S (Vita Suprinity) experienced a significant increase in translucency.

Conclusion: A high-translucency zirconia material (Ceramil Zolid) in group Z, after being immersed in gastric-like acid, demonstrated the most color stability, while a hybrid ceramic CAD/CAM block (Cerasmart 270) in group C demonstrated the least. Both color change and translucency parameters were influenced by gastric-like acid immersion for all tested CAD/CAM ceramics.

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sciforum-144220: Economic and Environmental Evaluation of 3D Printing in Restorative Dentistry: A Scoping Review

Maria Gabriela Packaeser de Souza [1], Amanda Maria de Oliveira Dal Piva [2], Cornelis Johanness Kleverlaan [2], João Paulo Mendes Tribst [1]

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[2] Department of Dental Materials, Academic Centre for Dentistry Amsterdam (ACTA), Universiteit van Amsterdam and Vrije Universiteit , Amsterdam, 1081 LA, The Netherlands

Introduction: Despite increasing adoption, there is a limited comprehensive analysis of the economic and environmental implications of 3D printing in restorative dentistry. This review aims to systematically explore existing literature on the cost-efficiency, material utilization, production timelines, and material waste of additive 3D printing methods versus conventional manufacturing techniques for dental restorations.

Methods: Adhering to PRISMA-ScR standards, a systematic search was conducted in March 2025 across PubMed, Embase, and Scopus databases. The included studies evaluated material costs, labor, equipment, and production duration for pressed and 3D printing techniques used in fabricating crowns, bridges, and dentures for permanent purposes. Data were extracted and analyzed independently, focusing on economic viability, material waste, environmental impact, and clinical outcomes.

Results: Out of 185 identified records, 9 studies met the inclusion criteria, encompassing in vitro experiments, clinical trials, retrospective analyses, and economic comparisons. The findings indicate that 3D printing generally incurs lower material and upfront costs, with reduced waste production compared to conventional methods. Although conventional manufacturing approaches offer superior precision and faster production for single restorations, 3D printing provides greater cost benefits and environmental sustainability, especially when producing multiple units. Clinical performance metrics, including patient satisfaction and retention, are comparable among the methods, with conventional methods slightly surpassing in accuracy.

Conclusion: 3D printing is the most cost-effective alternative for large-scale or provisional dental restorations. However, traditional manufacturing methods are preferred when high precision and strength are required.

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sciforum-144300: Adhesive Cementation of Lithium Disilicate Versus Zirconia Materials: Study of 2 Case Reports

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Introduction:

Bonding is considered the gold standard for the luting of all-ceramic crowns, as it provides strong micromechanical and chemical adhesion between the tooth and the restoration. This approach enhances retention, improves marginal adaptation, reduces microleakage, and supports optimal esthetics. However, bonding protocols must be tailored to the ceramic material used. Glass-ceramics, such as lithium disilicate, can be etched with hydrofluoric acid and silanized, achieving reliable bond strength. In contrast, zirconia requires alternative protocols, including the APC concept (air abrasion, phosphate monomer-containing primer, and composite resin cement), to optimize adhesion.

Methods:

Two clinical cases treated at the fixed prosthetic department of the dental clinic of Monastir, Tunisia, were selected for comparison. In the first case, a maxillary anterior tooth was restored with a lithium disilicate glass-ceramic crown (E-max) using conventional adhesive bonding with hydrofluoric acid etching and silane application, followed by resin cementation. In the second case, a zirconia anterior crown was placed following the APC concept.

Results:

Both treatment protocols demonstrated excellent clinical outcomes, including precise marginal fit, stable retention, and high esthetic integration. Postoperative follow-up revealed healthy periodontal tissues and patient satisfaction with the final appearance.

Conclusions:

Material-specific adhesive protocols are crucial for the long-term success of all-ceramic restorations. Hydrofluoric acid etching and silanization remain the gold standard for glass-ceramics, while the APC concept provides a reliable strategy for zirconia bonding. Understanding and applying these protocols enhances the functional performance and esthetic longevity of anterior ceramic crowns.

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sciforum-143844: Cast Gold vs. Fiber Post-and-Core in Restoring Severely Compromised Mandibular Molars: A 3D-Finite Element Analysis

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Introduction: Posts and cores are frequently used to enhance retention and mechanical performance in teeth with compromised coronal structure. Common strategies include gold cast post-and-cores and prefabricated fiber-reinforced composite (FRC) posts with composite resin cores. The elastic modulus of post materials influences stress distribution in root dentin. While some studies support high-modulus dowels, others advocate for materials with a modulus of elasticity closer to dentin. This study compared the biomechanical behavior of cast gold vs. FRC posts with composite cores using finite element analysis (FEA).

Methods: Two 3D models of a mandibular first molar were generated from micro-CT scans: (A) an intact molar (control) and (B) a structurally compromised molar restored with either (1) a cast gold post-and-core or (2) an FRC post and composite core, both restored with lithium disilicate crowns. FEA was performed on a fully dentate mandibular model, including bilateral occlusal contacts. Regular masticatory forces were applied, and stress distribution was evaluated. Major principal stresses were calculated for dentin (anisotropic behavior), while for the surrounding structures (isotropic behavior), the mvM analysis was applied. Validation was performed against experimental data.

Results: Both restored models showed maximum stress values in the crown and dentin similar to the control model. However, stress distribution differed significantly. Critical stress zones included the crown–core, core–dentin, and core–post interfaces and post preparation cavities. FRC posts and cores exhibited lower stresses, especially in the cervical dentin, more closely replicating a natural tooth's biomechanics. Cast gold cores showed nearly double the stresses near the core–post interface and presented higher stresses within the dentin's post preparation cavities. Stress and strain patterns in soft tissues (e.g., PDL) were similar across models.

Conclusions: While both systems restored biomechanical performance, FRC posts yielded a more favorable stress profile, particularly in critical areas of dentin, better resembling natural tooth behavior. Cast gold systems demonstrated higher stress concentrations in critical areas.

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sciforum-148843: Compressive Strength, Flexural Strength, Surface Microhardness, Wettability, and Bacterial Inhibition of Acrylic Bone Cements Modified with Silver-Doped CNTs

Tamer M. Hamdy

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Background: Acrylic bone cement is widely used in orthopedics and dentistry for primary bone fixation. However, its limited mechanical strength and poor biological interface pose clinical challenges. To enhance their properties, carbon nanotubes (CNTs) and silver nanoparticles (Ag) have been explored. CNTs are known to reinforce polymers, while Ag nanoparticles provide antimicrobial benefits. Combining both may yield a synergistic effect, improving mechanical strength and antibacterial performance. **Objective:** This study evaluates the effect of incorporating 0.05 wt% silver-doped carbon nanotubes (Ag-doped CNTs) into acrylic bone cement. Key properties assessed include compressive strength, flexural strength, surface microhardness, wettability, and antibacterial activity against *Staphylococcus aureus*. **Methods:** A control group was prepared using traditional acrylic powder mixed with monomer liquid. In the modified group, 0.05 wt% Ag-doped CNTs were added to the acrylic powder before mixing. Compressive strength, flexural strength, surface microhardness, and wettability were tested. Antibacterial activity was evaluated using an agar diffusion test against *S. aureus* to test the inhibition zone. Independent sample t-tests (p 0.05) were used to compare results between groups. **Results:** The modified acrylic cement exhibited significantly higher compressive strength (91 MPa), flexural strength (73 MPa), surface microhardness (39.1 VHN), and improved wettability (contact angle: 92.2°) compared to the control group, which recorded values of 72.3 MPa, 54.3 MPa, 21.1 VHN, and 107.9°, respectively. Additionally, the modified cement demonstrated a larger inhibition zone diameter against S. aureus (12.6 mm) than the control (9.1 mm) (P 0.05). **Conclusion:** Incorporating 0.05 wt% Ag-doped CNTs into acrylic bone cement significantly improves its mechanical and antibacterial properties. This modification holds strong potential for clinical applications in both orthopedics and dentistry, offering enhanced strength, better surface characteristics, and effective bacterial inhibition compared to traditional formulations.

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sciforum-149911: Effect of Brushing on Surface Roughness, Microbial Adhesion, and Color stability of 3D-Printed Provisional Restorations Fabricated with Different Print Orientations: An In Vitro Study.

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Background: This investigation evaluated the impact of brushing on surface roughness, microbial adhesion, and color stability of 3-unit, 3D-printed provisional restorations with different print orientations. Additionally, it aimed to compare these effects with those observed in commonly used provisional materials (PRMs).

Methods: 20 samples in each group were fabricated with four different provisional materials and techniques. A mandibular typodont was prepared for a 3-unit fixed partial denture with a missing first molar and scanned. The 3-unit provisional restoration was designed to fabricate polymethyl-methacrylate CAD/CAM milled and 3D-printed provisionals with print orientations of 0, 45, and 90 degrees. Putty index of the printed provisional was made to manually fabricate auto-polymerized and Bis-acrylic resin provisionals. All samples were polished and subjected to artificial brushing simulation using a brushing simulator. The surface roughness of the provisional restorations was evaluated before and after brushing simulation. *Streptococcus Mutans* were cultured and colony-forming units were measured before and after brushing. Color changes were measured after immersing the samples in coffee after 1, 7, and 15 days. Inter-group comparisons were performed, and the significance value was kept at P=.05.

Results: Brushing caused significant changes in surface roughness, microbial adhesion and color change in all the three print orientations (P.05). The highest surface roughness, microbial adhesion and colour changes were observed in 0 degrees, and the least in 90 degrees. All print orientations showed significant differences from other PRM groups for microbial adhesion (p 0.05) and with Bis-acrylic resin for colour change on all the days.

Conclusion: Brushing caused significant changes in surface roughness, resulting in significant microbial adhesion and color change in 3D-printed provisionals. Further, 3D-printed samples with 90 degrees showed the most promising results and thus are suggested for use as a long-term provisional material. As compared to other PRMs, significant differences in surface roughness and microbial adhesionwere were observed with all 3 print orientations, and in color change with bis-acrylic resin.

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sciforum-149643: Enhancing thermal and thermomechanical properties of 3D printed denture base resin with titanium dioxide nanotubes

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Introduction: Three-dimensional printed dentures have poor thermal and thermomechanical properties, which hinder their clinical applications. Previous denture nanocomposite studies focused on mechanical and physical properties. In this study, the impacts of TiO_2 NT addition to 3D-printed denture based on some thermal properties were studied for the first time.

Methodology: Digitally formed specimens (DLP Asiga 3D printer) for 1) Hot-Disc (thermal conductivity (W/km), diffusivity (mm^2/s), volumetric heat capacity (MJ/m^3K) tests). 2)Thermomechanical-analyzer (TMA) (coefficient of thermal expansion ($10^{-6}/K$), thermal strain (%) and elastic modulus (N/mm^2)). 3) Glass transition temperature (Tg) (^0C) (by DSC, DTA and TMA). 4) Thermal stability (weight%). 5) Degree of conversion (DC%) by ATR-FTIR. Following ISO (22007, 11359, 11357, 11358 and 10640), respectively. TiO_2 NTs (Diameter=30-70nm and length=2-4µm) were added at 1.0 wt.% and 2.0 wt.%. Ultrasonication (3 minutes) for nanotube dispersion, magnetic stirrer (8 hours) for TiO_2 NTs/ 3D liquid resin mixing. Printing settings: slice thickness=50µm, heater temperature=30°C, wavelength=385nm, 90-degree printing orientation and (65 watts/30 minutes) post-polymerization curing. The effective sample size was 30 specimens for each test (10 specimens for each group), which was calculated using G power (power=85%, alpha error=.05, effect size=0.25, groups=3, measurements=5 (30°C, 40°C,50°C,60°C,70°C)). Data analysis via SPSS and Prism 8.4. Shapiro–Wilk (normality), Levene (homogeneity), ANOVA and post-hoc tests were utilized. Significance level at α=.05.

Results: Increasing TiO_2 NT concentration improved all the tested thermal and thermomechanical properties. However, Tg increased for the 1.0 wt.% group and decreased for the 2.0 wt.% group. The Tg decreased due to the aggregation of the nanofiller and functioned as a plasticizer or impurity, thus increasing the mobility of the chains. The DC% increased in both 1.0 wt.% and 2.0 wt.% groups, although this increase was statistically non-significant with a P value of 0.9801).

Potential clinical impact: improvement in thermal perception. A marginal deterioration reduction between different denture parts interface, and improved ability to withstand wide range of intra-oral temperatures during eating.

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sciforum-143352: Incorporation of nanoparticles into the thermal behavior of polycarbonate resin: A systematic review

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Background: Nanoparticles are used for preventing oral diseases, fabricating prostheses, and for dental implantation. They are also used for delivering drugs for oral application, preventing and treating oral diseases, includeing oral cancer, and maintaining the health of oral tissues to a greater extent.

Purpose: To systemically analyze the thermal behavior of nanoparticles-incorporated polycarbonate resin.

Materials and Methods. Online databases like Google Scholar, PubMed, PubMed Central, Scopus, Cochrane, and Science Direct were searched using the key terms polycarbonate resin OR nanoparticles, polycarbonate resin AND nanoparticles, and polycarbonate resin NOT nanoparticles from 1st January 2010 to 31 st December 2024. The inclusion criteria were in vitro studies with full-text articles in the English language, and the exclusion criteria were clinical research, randomized clinical trials, animal studies, articles with only abstracts available, and literature reviews.

Results. After applying the inclusion and exclusion criteria, 22 original articles were thoroughly analyzed, and 11 studies were selected for a systematic review. Thermal properties like glass transition temperature and decomposition of polycarbonate and nanoparticle composites were affected by nanoparticles such as Silica, Titanium, Zinc, and Zirconium at various percentages.

Conclusion. Thermal properties like glass transition temperature, light transmission, and decomposition rate decreased, while the storage modulus and flame retardancy increased with the increasing percentage of Silica, Titanium, Zinc, and Zirconium nanoparticles.

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sciforum-141064: Less is More: The Impact of Minimally Invasive Posterior Restorations

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Abstract

Introduction:

Minimally invasive posterior restorations (MIPRs) aim to preserve tooth structure while ensuring optimal function and esthetics. Adhesively bonded restorations such as onlays, overlays, and endocrowns provide conservative alternatives to full crowns. The clinical performance of these restorations depends largely on appropriate material selection, preparation design, and bonding procedures.

Methods:

This work presents four clinical situations illustrating different applications of MIPRs: a lithium disilicate endocrown, a zirconia endocrown, a disilicate onlay, and a zirconia overlay. Each case was analyzed regarding indication, preparation strategy, CAD/CAM fabrication, and adhesive luting protocol. Special attention was given to margin management, Immediate Dentin Sealing (IDS), and occlusal integration.

Results:

Clinical observations revealed satisfactory marginal adaptation, occlusal harmony, and esthetic integration in all four cases. Lithium disilicate restorations provided excellent translucency and enamel bonding potential, while zirconia offered enhanced fracture resistance in high-stress situations. IDS improved bonding reliability and reduced postoperative sensitivity. No complications were observed during follow-up.

Conclusions:

The clinical outcomes from these four cases support the reliability of MIPRs as conservative and durable treatment options for posterior teeth. The choice between disilicate and zirconia should be guided by the amount of residual tooth structure, esthetic expectations, and functional demands. Mastery of adhesive techniques remains essential for long-term success.

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sciforum-144488: Minimally Invasive Management of Traumatized Maxillary Incisors

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Minimally invasive management of traumatized maxillary central incisors is crucial for preserving tooth structure, function, and esthetics. This approach is supported by current evidence on traumatic dental injuries (TDIs). A recent literature review, which spanned from 2010 to 2025 and utilized databases like Google Scholar and PubMed, focused on identifying and analyzing conservative techniques for maxillary incisor fractures. This comprehensive search also included a manual review of references from selected articles to ensure no relevant information was missed. To illustrate this conservative philosophy, a compelling case report is presented. The patient, who suffered a traumatic injury to a maxillary central incisor, was successfully treated using a multi-step, minimally invasive protocol. The treatment began with the strategic placement of a fiber-reinforced composite post and core, which provided foundational support without the need for excessive tooth removal. This was followed by a carefully planned preparation for a lithium disilicate layered zirconia crown. This choice of material and technique ensured the preservation of the patient's remaining sound tooth structure, a key principle of the treatment. The outcome of this approach was the successful restoration of both function and esthetics. By prioritizing a conservative strategy, the treatment not only achieved structural integrity and esthetic harmony but also secured a favorable long-term prognosis for the tooth. This case serves as a powerful example that traumatic injuries to maxillary central incisors can be managed effectively with minimally invasive strategies, ensuring excellent long-term functional and esthetic outcomes while prioritizing the preservation of the natural tooth.

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sciforum-143956: Non-Invasive Therapy for Disc Displacement with Reduction and Myalgia: A Case Report

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Introduction. Disc displacement with reduction (DDwR) and myalgia are among the most common temporomandibular disorders, frequently affecting young adults. While conservative therapy is considered the first-line approach, the evidence on long-term outcomes is still limited. **Case Presentation**. A 22-year-old female had a 7-month history of left-sided TMJ clicking, deviation to the left during opening, and 2 months of bilateral masticatory pain, which was worsened by mastication. During clinical examination, reproducible left TMJ clicking and tenderness of the masseter and temporal muscles were observed. Based on DC/TMD Axis 1, DDwR with myalgia diagnosis was made. **Intervention and Results:** A full maxillary stabilization splint was constructed and delivered together with patient education, dietary adjustments, and guided mandibular exercises. At baseline, pain intensity was VAS 6/10 with a maximum unassisted mouth opening of 41 mm and reproducible joint clicking. After 2 weeks, the patient reported a decrease in pain, VAS 2/10, mouth opening was 44 mm, and joint sounds were absent. After 1 year, the patient was asymptomatic (VAS 0/10) with stable function, preserved mouth opening, and completion of daily activities without limitations. **Clinical Relevance and Conclusion**: This case shows that multi-directional non-invasive therapy can result in complete and long-term remission of DDwR with myalgia. It emphasizes the need for careful diagnosis, through standardized instruments such as DC/TMD, and the need for personalized treatment to ensure durable clinical success.

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sciforum-143929: Occlusal Splints Thickness in the Treatment of Temporomandibular Disorders, Review of Current Evidence

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Introduction. Occlusal splints are oral appliances which has been designed to relieve the temporomandibular symptoms. Anyway, the thickness of occlusal splints in order to have optimal efficacy is still controversial. **Methods**. An electronic search in Medline, Scopus, and Web of Science databases was conducted, using the following keywords up to January 2025: *("occlusal splint" OR "stabilization splint" OR "bite splint") AND ("vertical dimension" OR "thickness" OR "occlusal height") AND ("temporomandibular disorder" OR "TMD" OR "disc displacement" OR "myofascial pain")*. All titles and abstracts were screened. Studies comparing different thicknesses of occlusal splints were included. **Results.** Eight studies met the inclusion criteria, from which five randomized controlled trials, one retrospective study, and two finite element analyses. Mixed quality of the studies was found. Based on current evidence, although limited, the following results could be deduced: Occlusal splints with moderate thickness, 3 mm, are recommended for those cases that involve both muscular and joint components, particularly when masticatory muscle pain is the primary complaint. Occlusal splints with minimal thickness, 2 mm, may be appropriate in internal derangements in the early stage, though evidence is low. Thicker splints, ≥4 mm for DDwoR and in cases with crepitus. Occlusal splints of ≤2 mm and >6 mm were associated with symptoms such as reduced functional outcomes or comfort. **Conclusion.** In most cases, occlusal splints with thicknesses of 3–5 mm seem to be optimal for most TMD cases; however, personalized treatment based on the respective diagnosis is recommended. The decision on splint thickness should be based on evidence according to the severity of the diagnosis, but also patient-centered, to achieve comfort, the compliance of the patient, and oral structure preservation. Further high-quality RCTs are needed to have evidence-based guidelines and to achieve consistent results.

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sciforum-140602: Posterior Mini-Invasive Restorations: The Dilemma of Material Choice

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Introduction: Minimally invasive dentistry prioritizes preserving tooth structure while restoring function and esthetics. For posterior restorations, choosing among various ceramic and hybrid ceramic materials presents a significant dilemma. The present work discusses the critical factors influencing the selection of these indirect materials, highlighting their properties, indications, and the challenges in optimizing clinical outcomes.

Methods: The material classes considered include feldspathic porcelain, leucite-reinforced ceramics, lithium disilicate, zirconia (monolithic and layered), and resin–ceramic hybrid materials. Evaluation criteria encompass mechanical properties (flexural strength, fracture toughness, wear resistance), esthetics, bondability, biocompatibility, and their ability to facilitate conservative tooth preparation. Clinical scenarios and patient-specific factors like occlusal load, esthetic demands, and opposing dentition are also addressed.

Results: For posterior mini-invasive restorations, lithium disilicate is a common choice, offering excellent esthetics and good mechanical properties for inlays, onlays, and crowns. Zirconia, particularly in monolithic forms, is preferred for high-occlusal-load situations due to its superior strength, though esthetics may vary with opacity. Newer translucent zirconias balance esthetics and strength. Resin–ceramic hybrid materials combine polymer resilience with ceramic wear resistance, offering shock absorption and ease of repair for specific minimally invasive applications. The dilemma often involves balancing strength, esthetics, and conservative preparation, as material properties directly influence required preparation dimensions. Patient factors like bruxism or limited interocclusal space further complicate the decision.

Conclusions: Selecting indirect ceramic or hybrid ceramic materials for posterior minimally invasive restorations in prosthodontics is a complex decision. While lithium disilicate and zirconia offer robust options for strength and esthetics, resin–ceramic hybrids provide unique advantages. The ultimate choice hinges on a thorough clinical assessment, aiming to resolve this material dilemma for optimal long-term success of conservative restorations.

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sciforum-150037: Prosthetic rehabilitation of velopharyngeal insufficiency in a patient with locally advanced carcinoma oropharynx: a case report

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Introduction:

Oropharyngeal carcinoma and its treatment can cause structural and functional loss of the soft palate, leading to velopharyngeal insufficiency (VPI) with hypernasality, nasal regurgitation, and impaired speech. When surgical reconstruction is not feasible, prosthetic rehabilitation with a velopharyngeal obturator, supported by speech therapy, offers an effective alternative.

Methods:

A 50-year-old male presented with a 2-month history of dysphagia, voice change, and slurred speech. Clinical and radiological evaluation revealed an ulceroproliferative lesion involving the soft palate, right tonsillar fossa, and pharyngeal wall with cervical lymphadenopathy. Biopsy confirmed moderately differentiated squamous cell carcinoma. Following treatment, he developed loss of the uvula and posterior soft palate, resulting in incomplete velopharyngeal closure. A customized velopharyngeal obturator was fabricated to restore soft palate function. Concurrently, a structured speech therapy program was initiated to correct compensatory articulation, enhance intraoral pressure, and improve airflow control.

Results:

The obturator provided immediate improvement in oro-nasal separation, reducing hypernasality and nasal regurgitation during swallowing. With adjunctive speech therapy, the patient achieved consistent oral articulatory placement and improved intelligibility. Rehabilitation also enhanced swallowing and contributed to psychosocial confidence.

Conclusion:

This case demonstrates the importance of prosthetic rehabilitation for patients with VPI after oral cancer treatment. A velopharyngeal obturator, combined with targeted speech therapy, represents a minimally invasive and cost-effective approach to restore soft palatal closure, improve speech and swallowing, and enhance quality of life.

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sciforum-150015: What is the effect of brushing and immersion in hygiene solutions on the roughness of 3D Printed resins for base and teeth dentures?

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Printed digital and conventional complete dentures require appropriate hygiene materials and methods to prevent the formation of biofilm, tartar, stains, inflammation, and odor. However, some hygiene materials can affect resin properties, such as surface roughness, which, when increased, can favor biofilm adhesion and development. In the literature, it has been reported that roughness values ≤ 0.2 µm are considered clinically acceptable; however, studies evaluating the effects of hygiene protocols on the roughness of printed resins are scarce. So, this study compared the roughness of 3D printed resins for denture bases (3DB) and teeth (3DT) to conventional resins for base (CB) and teeth (CT), after hygiene protocol use. Ten specimens of each material were subjected to brushing and immersion in water (EA, control), 0.25% sodium hypochlorite (EHS), or 0.15% triclosan (ET). Roughness was measured after obtaining the specimens (T0) and after simulating daily 6-minute brushing and daily 20-minute immersion for 1 (T1) and 3 years (T3), using a confocal laser microscope (µm). Data were analyzed using Generalized Estimating Equations (GEEs) and Wald test with Bonferroni adjustment (α=0.05). Roughness was influenced by the following interaction: resin × hygiene protocol × time (p=0.012). In T1, the average roughness (Sa - µm) of the 3DB (EA: 0.239; EHS: 0.258; and ET: 0.265) and 3DT (EA: 0.211; EHS: 0.202; ET: 0.248) resins was considered unacceptable. In T3, the roughness of the 3DB (EA: 0.183; EHS: 0.161; ET: 0.199) and 3DI (EA: 0.181; EHS: 0.173; ET: 0.188) resins decreased, possibly due to the removal of superficial layers of resin through brushing, exposing inner layers with less roughness. Conventional resin roughness remains within acceptable limits regardless of hygiene protocol. Compared to conventional resins, printing resins should be indicated for short-term situations, when associated with the proposed hygiene protocols. Hygiene protocols can be recommended for both conventional resins during the periods studied.

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Session 2. Digital Technologies and Artificial Intelligence in Prosthodontic

sciforum-142734: “12 Month Clinical Evaluation of an Innovative Digital Index for the Follow-Up of Edentulous Patients”

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Aim

Nowadays, digital technologies have deeply changed prosthetic paradigms and dentists are increasingly providing dental treatments with a full digital workflow. This study aimed to assess whether edentulous patients, who were trained by a dental hygienist about hygienic maintenance, show a different plaque retention at the intaglio surface of full dentures (FD) compared to untrained patients. Additionally, the study aimed to introduce a new digital index for the denture hygiene evaluation.

Materials and Methods

Thirty edentulous patients were enrolled by dentists of the Scientific Unit of Digital Dentistry, directed by Prof. Fernando Zarone, and were randomly divided into two groups: trained (TG) or control group (CG). TG received practical demonstrations on home hygiene procedures, while CG received only written instructions following the American College of Prosthodontists’ guidelines. At baseline and 1 year follow-up, a plaque detector was used in the FD intaglio, then a photographic documentation and an intraoral scan of the FD were performed. Scan data was analyzed by MeshLab software to calculate the "Zarone Index," detecting the percentage of denture surface covered with plaque.

Results

Power analysis confirmed the study's statistical validity. Normality and homogeneity of variance tests were performed. The Welch test showed statistically significant differences (p0.001) between the "Trained Baseline" and "Trained Follow-up" groups, as well as between the "Trained Follow-up" and "Control Follow-up" groups. No significant differences between the "Control Follow-up" and "Control Baseline" groups were evidenced.

Conclusion

Trained patients demonstrated both statistically and clinically significant improvements in prosthesis care and home hygiene. These findings highlight the importance of a collaborative approach involving dentist, hygienist and patient in order to improve the treatment outcomes. These preliminary results will be extended with a longer-term follow-up.

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sciforum-144138: 3D Facial Imaging: A Comparative Study of Modern Scanning Techniques

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Purpose:

This study aimed to evaluate the accuracy, consistency, and clinical relevance of four 3D facial scanning technologies—photogrammetry, AI-assisted capture, and structured light devices—for digital facial reconstruction in prosthetic dentistry. The goal was to validate accessible digital workflows by comparing digital measurements to conventional anthropometric methods and to identify the most efficient solutions for clinical integration.

Methods:

A clinical cohort of thirty adult participants requiring facial prosthetic rehabilitation underwent 3D facial scanning using four technologies: Polycam (photogrammetry), Luma AI (AI-assisted), Bellus3D (structured light), and Revopoint POP 2 (light-based scanning). Traditional anthropometric measurements were used as reference. All 3D models were scaled and standardized in Blender using a custom Python script. Anatomical landmarks were manually positioned, and Euclidean distances were calculated. Statistical analysis included ANOVA, ICC, Pearson correlation, and Bland–Altman plots.

Results:

Revopoint exhibited the highest accuracy (0.12 ± 0.03 mm) and consistency (ICC = 0.98), followed by Polycam (0.15 ± 0.04 mm; ICC = 0.96). Notably, Polycam achieved the shortest scan time (18 ± 2 s), offering a rapid and patient-friendly option. Luma AI and Bellus3D performed lower across all metrics. Statistically significant differences (p 0.001) were observed among devices. Revopoint and Polycam showed the closest agreement with reference data.

Conclusions:

While Revopoint remains the gold standard in precision, Polycam emerges as a clinically viable, time-efficient, and accessible tool for facial scanning. The proposed workflow is reproducible and adaptable for integration into digital prosthetic workflows. Further research should explore automated landmark detection and clinical validation on larger cohorts.

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sciforum-143190: Effect of Clinical Experience on Acquisition Time and Chairside CAD Design Accuracy: An In Vitro Study

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AIM

This in vitro study aimed to assess the influence of clinical experience on two key aspects of the digital chairside workflow: intraoral scanning efficiency and the morphological accuracy of CAD-designed prosthetic crowns, by comparing three operator groups with different levels of experience.

MATERIALS AND METHODS

Thirty dental operators were divided into three homogeneous groups: ten sixth-year dental students (S), ten general practitioners (O), and ten prosthodontic specialists with advanced clinical expertise (P). The reference model featured the lower left second premolar, prepared with a horizontal finish line and supragingival margin (Fig. 1). Each operator performed three digital scans of the model following a standardized scanning strategy (Fig. 2), and completed a CAD design of a crown on the prepared tooth (Fig. 3). Digital impressions were acquired using the Primescan intraoral scanner (Dentsply Sirona), and designs were created with CEREC 5.3 software. Scan time was manually measured with a stopwatch. Three expert prosthodontists independently assessed the CAD crown quality using a Visual Analogue Scale (VAS).

RESULTS

Mean scan times were group S = 231.80 s; group O = 174.40 s; group P = 70.00 s. Mean VAS scores were S = 7.60; O = 9.00; P = 9.60 (Table 1). The Shapiro–Wilk test indicated a non-normal distribution ($p > 0.005$). The Kruskal–Wallis test revealed significant differences between students and prosthodontists in both scan time ($p = 0.002$) and CAD quality ($p = 0.012$) (Table 2). No significant differences emerged between students and general practitioners, nor between practitioners and prosthodontists.

CONCLUSION

Despite all operators producing clinically acceptable results, a positive correlation was found between clinical experience and performance in terms of scanning efficiency and CAD design quality.

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sciforum-144120: Evaluating artificial surface bridging in intraoral scans: A comparative in vitro study of six IO scanners

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Aim: The aim of this study is to quantify the artificial surface bridging area between non-contiguous tooth surfaces using multiple scans from six different intraoral scanner devices.

Materials and Methods: A typodont master model with an onlay preparation on the maxillary left first molar (tooth 26) was scanned using a laboratory-grade scanner. To obtain controlled interproximal gaps, an artificial digital separation was created between the prepared surface of tooth 26 and the adjacent second molar (tooth 27). Interdental distances of 100 µm, 300 µm, 500 µm, and 700 µm were digitally modeled, generating six different intraoral scanners: 3Shape TRIOS, Dentsply Sirona Primescan, iTero Element, Carestream CS 3800, Medit i900, and SIRIOS. Each model was scanned ten times, producing four different STL files, which were then 3D printed using polyurethane resin. The resulting STL files were analyzed using MeshLab software for metrological evaluation. Bridging surface areas were measured and analyzed using descriptive statistics and post hoc tests.

Results: The statistical results showed that, at 100 µm, the mean ranged from 4.35 to 5.60 mm^2; at 300 µm, from 1.57 to 5.11 mm^2; at 500 µm, from 2.00 to 4.75 mm^2; and at 700 µm, from 2.03 to 4.35 mm^2. The Friedman test revealed statistically significant differences among the experimental groups. Post hoc Bonferroni tests confirmed significant differences between the analyzed intraoral scanners at interproximal distances of 0.1, 0.3, 0.5, and 0.7 mm.

Conclusion: Bridging artifacts were present at all tested distances within the study limits. The outcomes at 0.7 mm showed values that could be regarded as potentially suitable for clinical use.

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sciforum-143908: A Full Digital Workflow for Immediate Removable Denture Fabrication and Overdenture Rehabilitation in Elderly Patients: A Proof of Concept for Maxilla and Mandible

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Elderly patients often present with multiple co-morbidities and reduced mobility, making frequent dental visits challenging. Many have insufficient residual bone for fixed implant prostheses, while limited manual dexterity or cognitive decline may compromise oral hygiene. Financial limitations can also preclude multiple implant placements. In such cases, an implant-supported overdenture offers an optimal balance between function, aesthetics, and cost. Digital technologies now allow streamlined treatment with fewer appointments, greater accuracy, and improved comfort. This proof-of-concept protocol integrates a full digital workflow for extractions and immediate delivery of a digitally designed, 3D-printed removable denture, followed by immediate implant placement and fabrication of the definitive overdenture with minimal clinical sessions.

Methods: The protocol was applied to maxillary and mandibular edentulous cases. Preoperative data included intraoral scanning, CBCT, facial scanning, and virtual patient integration. Digital planning in Exocad DentalCAD software involved virtual articulator use for occlusal plane modeling, digital smile design, extraction simulation, implant positioning, and denture design. Removable dentures were 3D-printed in biocompatible resin and delivered immediately after extractions. Where indicated, implants (four in the maxilla, two in the mandible) were placed in the same session using sleeveless guided surgery planned in R2Gate software, and the dentures were adapted as interim prostheses. Definitive overdentures were fabricated conventionally in fewer appointments. Patient-reported outcomes were measured on a Visual Analog Scale (VAS).

Results: The workflow enabled accurate pre-surgical planning, immediate prosthesis delivery, and efficient transition to the final overdenture. In both arches, immediate dentures provided satisfactory aesthetics and function during healing. Patient satisfaction was high, especially due to reduced treatment time and minimal visits.

Conclusions: This protocol is a feasible, predictable, and time-efficient approach for elderly patients, reducing discomfort and enhancing treatment acceptance. Validation in larger cohorts is recommended.

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sciforum-149612: A revolution in dentistry: AI-powered 3D scanning and printing system for custom prosthetics, implants, and orthodontics using Palano-enhanced implants

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This research introduces a transformative breakthrough in dental medicine through the development of an integrated system that combines artificial intelligence, 3D printing, and sustainable nanotechnology. The system is built on three key pillars: first, high-precision digital scanning, which captures highly detailed and accurate images of oral and dental structures; second, AI-driven algorithms, which analyze and process these data to design fully customized prosthetics, implants, and orthodontic devices tailored to the unique needs of each patient; and third, 3D printing with eco-friendly nano-enhanced materials, ensuring superior quality, durability, and biocompatibility.

The proposed system stands out by significantly reducing diagnostic and manufacturing time compared to conventional methods, while also lowering costs and promoting environmental sustainability through the use of advanced materials that minimize medical waste and ecological impact. Furthermore, this innovation enhances the patient experience by offering highly personalized and rapid treatment solutions, ultimately improving clinical outcomes and patient satisfaction.

This study aspires to redefine the future of dental prosthetics and digital dentistry by providing a comprehensive scientific model aligned with the Fourth Industrial Revolution and the Sustainable Development Vision 2030. By bridging advanced technology and medicine, the research contributes not only to advancing oral healthcare but also to supporting global sustainability efforts, thereby creating a positive impact on both human health and the environm

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sciforum-144347: Clinical Application of Photogrammetry in Mandibular Full-Arch Immediate Implant Rehabilitation: A Case Report

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Introduction:

Full-arch implant rehabilitations require precise transfer of implant positions to achieve passive fit and ensure long-term prosthetic success. In edentulous cases requiring extraction of all remaining teeth, immediate loading protocols are often preferred to minimize functional impairment and patient discomfort. Conventional impression techniques may introduce distortions, particularly in extensive rehabilitations. Photogrammetry offers a highly precise and efficient method for capturing three-dimensional implant positions, eliminating the inaccuracies and auxiliary aids often associated with conventional and digital impression workflows. This report illustrates the clinical application of photogrammetry in an immediate mandibular full-arch implant rehabilitation.

Materials and Methods:

A 64-year-old patient with severely compromised mandibular dentition due to advanced periodontal disease and generalized tooth mobility underwent extraction of all remaining mandibular teeth. Six implants were simultaneous placed following a conventional surgical protocol. Immediately post-implantation, implant positions were recorded using a photogrammetry system. Scan bodies were connected, and multiple images were captured from various angles to generate a digital three-dimensional map of implant locations. The photogrammetric dataset was merged with intraoral scans of the soft tissues and occlusion to design a CAD/CAM screw-retained provisional prosthesis, which was delivered under immediate loading conditions.

Results:

The provisional prosthesis exhibited an excellent passive fit, confirmed clinically and radiographically. The patient reported immediate improvement in masticatory efficiency, comfort, and esthetics. Following mandibular rehabilitation, maxillary prosthetic treatment was performed using a delayed loading protocol to achieve optimal occlusal balance and esthetic integration.

Discussion and Conclusion:

This case demonstrates that photogrammetry can significantly enhance the accuracy and efficiency of immediate full-arch implant rehabilitation. The method reduces impression-related distortions, eliminates errors from conventional impressions and reduces patient discomfort. Photogrammetry represents a valuable adjunct to contemporary digital implantology protocols, particularly in cases involving immediate loading.

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sciforum-142795: Comparative in vitro study of the marginal fit of 3D-printed nanocomposite crowns with horizontal and vertical preparation geometries

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Aim:

This study aimed to evaluate the marginal adaptation of 3D printed crowns with either horizontal or vertical margin preparations, scanned with an IOS (3Shape), showing an accuracy of 5 µm, at standardized environmental conditions.

Methods:

Two maxillary first premolar abutments were designed using CAD software, one with a horizontal preparation (Ho) and the other with a vertical preparation (Ve). Both abutments had a 5 degree angle of TOC (Total occlusal convergence); they were 3D printed in resin, and then mounted on a reference typodont. Ten crowns were fabricated for each preparation geometry using the DFAB 3D printer (DFAB CHAIRSIDE, Thiene, Italy). Cementation was simulated with polyether impression material, and then the crowns were scanned with an industrial metrological device (Atos Core 80; GOM GmbH, Germany). Finally, the scans were analyzed using a dedicated software (Geomagic Control X, Raindrop Inc., USA) to assess the marginal fit. Descriptive statistics (95% confidence interval) were calculated, and an independent samples t-test was performed at a significance level of $\alpha = 0.05$ to compare differences between groups.

Results:

Mean marginal fit values for both preparation geometries were below the clinically acceptable threshold of 120 µm, with Ho at 76.83 µm and Ve at 84.37 µm. No statistically significant difference was found between the two groups (Ho $p = 0.58$; Ve $p = 0.83$).

Conclusions:

Nanocomposite crowns fabricated via 3D printing showed mean marginal discrepancies within clinically acceptable limits for both vertical and horizontal preparation geometries, with no significant difference between the two.

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sciforum-142764: Digital Implant–Prosthetic Protocol for Maxillary Lateral Incisor Agenesis: A 4-Year Clinical Assessment of Soft Tissue Integration and Biomaterial Compatibility

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Aim

This prospective clinical protocol aimed to assess the four-year survival and success rates of single implant-supported monolithic zirconia crowns, fabricated through a fully digital workflow, in the prosthetic rehabilitation of patients presenting with unilateral or bilateral congenital absence of the maxillary lateral incisors. The study also analyzed biological and technical variables affecting clinical outcomes, including patient-reported satisfaction.

Methods

A total of 22 patients with mono- or bilateral agenesis of the maxillary lateral incisors were enrolled, receiving 30 narrow-diameter implants. Corresponding screw-retained monolithic cubiczirconia (5Y-TZP) crowns with internal connections were digitally manufactured and delivered. Clinical performance was objectively evaluated using the Functional Implant Prosthodontic Score (FIPS), while subjective patient satisfaction was measured using a Visual Analog Scale (VAS). Survival and success analyses were performed using descriptive statistics and the Kaplan–Meier method.

Results

At the four-year follow-up, the mean FIPS (Functional Implant Prosthodontic Score) was 9.2, and the mean VAS (Visual Analog Scale) score for patient satisfaction was 8.7. Cumulative survival and success rates were 100% and 93.3%, respectively, according to Kaplan–Meier estimates.

Conclusion

The use of a fully digital implant–prosthetic protocol represents a reliable and effective short-term solution for the functional and esthetic rehabilitation of maxillary lateral incisor agenesis. Nonetheless, further longitudinal studies are warranted to confirm the long-term predictability of this approach.

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sciforum-131915: DTX Studio Integrated with Exocad for Precise Esthetic Crown Lengthening and Veneers

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Background

The precise orchestration of crown lengthening and veneers in the esthetic zone remains a cardinal challenge in multidisciplinary oral rehabilitation. Traditional empiricism-based approaches inherently carry risks of unpredictable esthetic outcomes due to reliance on subjective estimation. To address this, a digital workflow integrating DTX Studio and Exocad was developed, enabling closed-loop precision control from diagnosis to prosthetic design.

Integration with Digital Workflow Elements

1. Multimodal Data-Driven Assessment

CBCT, intraoral scans, and facial topography were integrated to construct a patient-specific digital model for comprehensive assessment.

2. Virtual Planning for Biological Width Preservation

Exocad's morphology simulation reverse-engineers ideal gingival positions, quantifying gingival trimming with 0.1 mm accuracy. For example, if a veneer margin requires placement 1 mm apical to the existing gingiva, the digital workflow calculates a 3 mm total adjustment (1 mm gingival recontouring + 2 mm biological width), guided by the dual-positioning guide plate.

3. Surgical Guidance via 3D-Printed Precision

The dual-positioning guide plate, designed in DTX Studio using CBCT-derived bone segmentation, enforces precise bone reduction trajectories. Its primary cortical registration and secondary soft tissue matching ensure the surgical margin is maintained at the calculated 2 mm from the bone, minimizing risks of biological width violation

4. Post-Surgical Prosthetic Optimization

iTero scans post-healing capture final gingival topography, allowing Exocad to refine veneer emergence profiles, contributing to the 40% treatment duration reduction by eliminating iterative adjustments for biological width-related complications.

Result:

Surgical error was minimized to 0.3 mm (70% reduction vs. traditional methods)， as validated by the digital workflow's closed-loop control from CBCT segmentation to prosthetic design. Preoperative smile visualization via the multimodal model enhances patient understanding of how biological width preservation influences final pink–white esthetic harmony.

Conclusion:

The DTX-Exocad platform revolutionizes traditional workflows through data-driven decision-making and real-time workflow control, delivering quantifiable precision for complex rehabilitations. This technological convergence epitomizes evidence-based digital dentistry, where seamless workflows redefine clinical excellence.

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sciforum-145947: Evaluating the Mechanical Properties of 3D-Printed Denture Base Resin Modified with Grapefruit Seed Skin Particles

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Background: Polymethyl methacrylate (PMMA) remains the primary material for denture bases. Despite being the standard denture base material, PMMA often suffers from mechanical weaknesses and microbial colonization, leading to compromised denture performance over time. Grapefruit seed skin particles (GSSPs) are rich in flavonoids that have antifungal activity. When these materials are incorporated into denture base acrylic resins, they have enhanced antifungal properties but can also affect the material's strength and durability.

Purpose: This study aimed to investigate the impacts of incorporating different concentrations of GSSPs into 3D-printed resin on particle interactions with resin and the mechanical strength of the resulting composites.

Methods: A total of 90 specimens were fabricated using a Digital Light Processing (DLP) 3D printer. A total of 30 specimens were used for flexural strength, 30 specimens were used for tensile strength, and 30 specimens were tested for surface hardness. GSSPs were added at 0.0, 5.0, and 7.0 wt.% concentrations, which were established to be the appropriate ranges through pilot experiments. The flexural and tensile strengths were evaluated with a universal testing machine, whereas the surface hardness was measured using a Durometer Shore Hardness Scale. Fourier Transform Infrared Spectroscopy (FTIR) was used to determine the interactions between the resin and the particles and the degree of conversion (DC). Field emission scanning electron microscopy (FE-SEM) was employed to assess the particle distribution, porosity, and fracture patterns.

Results: In comparison with the control group, the GSSP-einforced specimens presented significant improvements in DC, flexural strength, tensile strength, and hardness. FE-SEM images revealed reduced porosity at higher concentrations, with evidence of brittle fracture characteristics.

Conclusions: Incorporating GSSPs into 3D-printed denture base resin improves the mechanical properties, suggesting a promising approach for enhancing the performance of denture base materials.

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sciforum-142802: Evaluation of Dental Students' Perception and Appreciation of 3D Augmented Reality Systems in Education: An Experimental Study.

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ABSTRACT:

Digital technologies have become an integral part of daily life, offering increasingly sophisticated tools across many professional sectors. With the growing integration of artificial intelligence and digital realities (AR, VR, MR), even specialized fields such as dentistry are beginning to benefit from these advancements. In particular, augmented reality now allows for the simultaneous visualization of intraoperative information and the remote sharing of clinical procedures.

AIM:

This study aimed to evaluate dental students' perception and appreciation of a 3D Augmented Reality system (Falko) used in an educational context, comparing 3D and 2D visualizations. The null hypothesis stated that no statistically significant difference would be found between the two modalities.

METHODS:

During a standard clinical teaching session, thirty dental students from various academic years were divided into two groups. One group used the 3D system via head-mounted displays and VR glasses, while the other used 2D displays via smartphones or clinic monitors. The session was delivered both in the clinical environment and remotely. At the end of the session, participants completed a questionnaire via Google Forms, consisting of six VAS-scale questions evaluating key aspects of the system's educational usefulness.

RESULTS:

Students reported a highly positive experience, with increased engagement and attention noted across both groups. Due to the non-normal distribution , the Student's t-test was not applicable. Instead, the Mann–Whitney test revealed a statistically significant difference for the 3D group.

CONCLUSION:

The null hypothesis was rejected, confirming that the 3D visualization mode was significantly more appreciated than the 2D one. Despite the encouraging findings, the innovative nature of this study and the limited sample size; further research with a larger sample size is needed to validate these results.

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sciforum-146898: Sustainable 3D Printing: Optimizing Waste Reduction and Recycling

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ABSTRACT

Introduction: The accuracy and efficiency of dental model fabrication has experienced significant progress in recent years. However, environmental concerns, such as the use of petrochemical by-products, overproduction of plastic and waste management, have redesigned new materials that can lessen these environmental challenges and contribute to a better ecological transition. Objective: To analyze cutting-edge technology in 3D printing techniques applied to the fabrication of dental models, with a particular focus on sustainable practices. Methods: This systematic review was conducted according to PRISMA guidelines. A comprehensive literature search was conducted using the electronic academic databases PubMed, Web of Science, and Scopus. The search strategy incorporated specific keywords and MeSH terms relevant to sustainable dental 3D printing. Scientific articles reviewed and published between 2020 and 2025 were considered. Studies written in English, German and Spanish were included in the selection process. Results: A total of five in vitro studies met the inclusion criteria and contain sufficient information for this review. All studies are in vitro and are peer reviewed articles from the years 2023-2024. The materials investigated in these studies were polylactic acid (PLA), recycled PLA, recycled resins and soy-based resins. The studies employed either fused filament fabrication (FFF) or vat polymerization technology (VAT) as the main 3D printing techniques. Each study addressed sustainability as a central theme. Conclusion: The results of this systematic review show the potential of 3D dental models in the adoption of more sustainable materials such as biodegradable and/or recyclable polymers but this approach is relatively novel in the dental sector. The performance of these innovative materials has improved in terms of dimensional accuracy, efficiency and clinical application. Materials such as polylactic acid (PLA) and fused filament fabrication (FFF) are set to play a key role in the advancement of environmentally friendly dental manufacturing.

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Session 3. Innovations and Challenges in Dental Implants

sciforum-144683: "Evaluating the Effects of Mechanical and Electrical Stimuli on Osteoblast Mineralization in Dynamic Cell Cultures"

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Introduction:

Functional xenografts are gaining momentum in tissue engineering because of their ability to replicate the complex microenvironment of native bone, where osteoblast function is influenced by mechanical loading and endogenous piezoelectric potentials generated by collagen. Poly-L-lactic acid (PLLA) scaffolds incorporating piezoelectric ceramics such as barium titanate ($BaTiO_3$) represent a promising approach to reproduce these cues. By converting applied stress into localized electrical signals at the cell–material interface, these scaffolds may activate osteogenic pathways. Characterizing their mechanical and physicochemical properties is therefore essential for assessing their translational potential.

Methods:

PLLA scaffolds (8–10 wt%) with 10 wt% $BaTiO_3$ were fabricated using thermally induced phase separation and freeze-drying. Morphological evaluation was performed with SEM, while $BaTiO_3$ dispersion was quantified using ImageJ analysis. Mechanical testing under uniaxial compression provided Young's modulus values. Osteoblast viability was assessed with MTT assays, and confocal microscopy was employed to observe mineralization.

Results:

SEM confirmed interconnected pores with uniform distribution, with 10 wt% PLLA scaffolds achieving optimal porosity (85.3 ± 2.1%). ImageJ analysis demonstrated homogeneous $BaTiO_3$ distribution, with 92.4 ± 3.7% surface coverage. Mechanical characterization revealed a Young's modulus of 1.47 ± 0.12 GPa for 10 wt% PLLA scaffolds, a value closely approximating trabecular bone. Biological assays indicated high osteoblast viability (>95%) across groups. Confocal microscopy revealed early mineralization in $BaTiO_3$-containing scaffolds, suggesting enhanced osteogenic activity.

Conclusions:

The PLLA–$BaTiO_3$ composite scaffolds exhibit favorable porosity, mechanical resilience, and cytocompatibility, supporting their application in bone regeneration. The combination of homogeneous $BaTiO_3$ dispersion and bone-mimetic mechanical properties underscores their potential as piezoelectric scaffolds for dental and orthopedic use. Future studies will focus on validating these findings under dynamic bioreactor conditions and conducting statistical comparisons of osteogenic outcomes.

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sciforum-147224: Innovative Ag–CaP–ZrO_2 Coatings on Ti6Al4V: A Multifunctional Strategy to Improve the Durability of Dental Implants

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Introduction:

Titanium alloy Ti6Al4V is widely applied in dental implantology due to its high mechanical strength and biocompatibility. However, its biologically inert surface limits osteointegration and provides insufficient protection against bacterial adhesion, which may compromise long-term clinical outcomes. Developing multifunctional coatings is therefore essential to overcome these limitations.

Methods:

A composite coating composed of calcium phosphate (CaP) and silver (Ag), reinforced with zirconium oxide (ZrO_2), was deposited on Ti6Al4V substrates using an immersion technique. Morphological and structural characteristics were assessed by SEM/EDS and XRD. Electrochemical performance was evaluated in artificial saliva using electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization. Antibacterial activity against *Staphylococcus aureus* and cytocompatibility with MG-63 osteoblast-like cells after 72 h of culture were also investigated.

Results:

The coatings exhibited a homogeneous and stable morphology. Electrochemical analyses showed a marked improvement in corrosion resistance, with a polarization resistance (Rp) of 861,652 $\Omega \cdot cm^2$ for Ti6Al4V–CaP/Ag,Zr compared to 492,253 $\Omega \cdot cm^2$ for bare Ti6Al4V and 232,086 $\Omega \cdot cm^2$ for CaP-only coatings. Silver incorporation reduced bacterial adhesion by approximately 75–80% , while cell viability remained above 80%, confirming the absence of cytotoxic effects.

Conclusion:

Ag–CaP–ZrO_2 coatings combined bioactivity, antibacterial activity, and superior corrosion resistance. These multifunctional surfaces represent an innovative and effective approach to enhancing osteointegration and improving the long-term clinical performance of dental implants.

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sciforum-149835: Microbiological study using phase-contrast microscopy for the disinfection of complete dentures anchored to ball-attachment implants

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Introduction: The microbial environment surrounding implant-supported overdentures plays a crucial role in the long-term success of rehabilitation, as inadequate disinfection can favor the growth of pathogenic species that jeopardize peri-implant health. The aim of this study is to analyze the effectiveness of a disinfection protocol for complete dentures anchored to ball attachments with respect to the peri-implant health of osseointegrated implants.

Methods: Thirty patients were randomly divided into two groups. All thirty patients had compatible flora (absence of spirochetes/Treponema denticola) at phase-contrast microscopy sampling. This was due to the modified oral hygiene protocol (sonic toothbrush and oral irrigator twice daily). The use of the irrigator was discontinued for all thirty patients. Group A disinfected their dentures with EC Ster daily, while Group B did not use EC Ster.

Peri-implant flora was re-examined with phase-contrast microscopy every month for 6 months.

Results: Patients in Group A maintained compatible flora at all samplings, but patients in group B did not (at 1 month, 2/15 patients developed incompatible flora, at 2 months 5/15, at 3 months 8/15, at 4 months 10/15, at 5 months 15/15, and at 6 months 15/15). Peri-implant parameters were stable and constant in group A, but they slowly worsened in group B (plaque index, bleeding on probing, peri-implant probing).

Conclusions: EC Ster maintains an environment unfavorable to the development of spirochetes (Treponema denticola), promoting greater stability in the peri-implant compartment.

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sciforum-149917: The Effect of Surface Modifications on the Biocompatibility of PEEK Dental Implant Material

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Introduction:

Introduction: Polyetheretherketone (PEEK) is considered as an alternative to titanium for dental implants due to its favourable properties. However, its bio-inert and hydrophobic surface limits osseointegration. This study investigated the effects of sandblasting and gold sputter coating on cell viability of fibroblasts in contact with PEEK.

Methods: Eighty PEEK discs (8mm diameter × 2mm height; PEEK Bio Solution) were divided into four groups: untreated (C), sandblasted (SB), gold sputter coated for 30s (G30), and sputter coated following sandblasting (SBG30). The specimens were sandblasted with 50µm alumina particles at 0.25MPa pressure for 10s (Duostar, BEGO). A gold sputter coater (Agar Scientific Ltd., Stansted) was used at 30mA for 30s against the G30 and SBG30 groups. Surface roughness (Sa and Ra) was assessed by optical profilometry (Profilm3D®, Filmetric) and analysed using MANOVA. Cell viability was evaluated using L929 fibroblasts via MTT assay at 2 and 7 days, analysed by two-way ANOVA. A pilot qualitative assessment was utilised to further examine cell proliferation.

Results: Sandblasting significantly influenced roughness (p0.001) with SBG30 showing the highest values (Sa = 1.398 ± 0.920µm; Ra = 0.663 ± 0.185µm), while C showed the lowest (Sa = 0.386 ± 0.476µm; Ra = 0.180 ± 0.050µm). Cell viability significantly increased over time for all surface treatments (p0.001, η^2 = 0.896), with SB showing the lowest values at 2 days (26.55 ± 9.53%), but the highest values at 7 days (136.04 ± 26.74%). These results with a pilot microscopy assessment revealed enhanced proliferation, suggesting a correlation between roughness and cell attachment. There was no interaction effect between the surface modification and the time (p0.076, η^2 = 0.129).

Conclusions: Sandblasting, with or without gold coating, enhanced PEEK's roughness into the optimal Sa and Ra, which was found to be associated with favourable fibroblast proliferation. These findings highlight sandblasting as an effective surface modification to improve the biological performance of PEEK in dental implant applications. In contrast, gold sputter coating on its own did not show any significant effects on cell viability.

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sciforum-143714: Internal Sinus Elevation with Osseodensification and i-PRF Sticky Bone Graft: A Case Report

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Background:

Posterior maxillary rehabilitation is often complicated by sinus pneumatization and reduced residual ridge height. Traditionally, multiple adjacent implant placements in such situations require an open lateral sinus elevation. Minimally invasive internal sinus lift techniques, particularly when combined with biologically active grafts, offer a promising alternative. This case highlights the novelty of performing closed sinus elevation at multiple adjacent sites in a **subantral Class 3 case**, supported by the use of platelet-rich fibrin (PRF)-based sticky bone to enhance osteogenesis.

Case Description:

A 43-year-old female patient (ASA I) presented with multiple missing posterior teeth in the right maxillary arch, impairing mastication. CBCT revealed sinus pneumatization with reduced alveolar bone height, classifying the case as **subantral Class 3**. Internal sinus elevation was performed using osseodensification burs. Sticky bone was prepared by combining autologous PRF with a xenograft (Bio-Oss, Geistlich Pharma, Switzerland) using a centrifugation protocol (2700 rpm for 12 minutes). Three implants (4.0 × 10 mm) were simultaneously placed at the first premolar, second premolar, and first molar sites.

Results:

Sinus membrane elevations of 3.58 mm, 4.45 mm, and 6.69 mm were achieved. Implants demonstrated primary stability of 30–40 Ncm and ISQ values of 62–74. Post-operative CBCT confirmed **complete bony housing along the full implant length**, indicating substantial bone gain and increased peri-implant bone density. After 3 months, osseointegration was achieved, and a cement-retained zirconia fixed partial denture was delivered.

Conclusion:

Closed sinus elevation across multiple adjacent implant sites in a **subantral Class 3 case**, combined with PRF-enriched sticky bone, enabled predictable vertical bone gain and complete implant housing without the need for open sinus augmentation. The incorporation of growth factor-rich PRF enhanced the osteogenic potential of the sinus membrane, supporting rapid healing and successful implant integration. This approach demonstrates a minimally invasive and biologically favorable strategy for managing posterior maxillary edentulism with reduced ridge height.

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sciforum-144485: Metal–Organic Frameworks (MOFs) in Dental Research

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Metal–organic frameworks (MOFs) are a class of porous and highly ordered crystalline materials composed of metal ions or clusters coordinated with organic linkers. MOFs possess a high surface area, porosity, chemical and thermal stability, and the ability to be tailored using both organic and inorganic units. MOFs also exhibit antibacterial, biodegradable, and biocompatible properties depending on the metal and organic linker used. Due to these properties of MOFs, they are utilized in a wide range of applications, such as the storage of energy-related gases like hydrogen, the adsorption of chemicals, the detection of different molecules, the delivery of drugs, etc. Because of their high drug-loading capacity and slow-release processes, the drug delivery properties of MOFs are very crucial in biomedicine. Additionally, the physicochemical and mechanical properties of MOFs may also help improve the quality of the desired materials. Despite their extensive biomedical applications of MOFs, their potential in dentistry remains largely unexplored. In fact, MOFs are particularly relevant for dental research. For example, MOFs could be very useful in preparing dental composites or coatings for implants. The organic linkers of MOFs can be modified to introduce specific groups, such as methacrylate, which is useful for dental composites. Antibacterial coatings for implants are also possible. Herein, I aim to introduce the potential of MOFs to the field of dental research. This presentation will address detailed information about the synthesis, characterization, and application areas of MOFs, and then explore the application of MOFs as emerging, innovative materials in dental research. Consequently, this overview highlights both the opportunities and challenges of employing MOFs in restorative and implant dentistry, pointing towards future directions for research and clinical translation.

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sciforum-149974: Patent-Based Socket-Shield Technique Utilizing Bone Trephine: A Case Series

Haseeb H. AlDary

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Introduction:

Post-extraction bone remodeling, often accompanied by buccal bone loss, presents a challenge in implant dentistry, potentially complicating implant placement and compromising esthetic outcomes. The socket-shield technique (SST) preserves the buccal root fragment to mitigate these changes; however, conventional SST is technique-sensitive, time-consuming, and carries risks such as root injury or shield displacement. A guided trephine-based technique was developed to enhance accuracy and predictability in shield preparation.

Methods:

This case series reports on three patients with nonrestorable maxillary anterior teeth treated in a private practice. Surgical guides were digitally designed and fabricated to direct trephine burs, as described in a patented approach (WO 2024/038478 A1; USPTO No. 509030716). The guided trephine was used to prepare and preserve a precise buccal root segment to maintain periodontal and alveolar integrity. Immediate implants were placed in the palatal socket, and restorations were completed following a standard delayed protocol. Clinical and radiographic follow-up after loading demonstrated stable outcomes at 12 months (Case 1), 6 months (Case 2), and 3 months (Case 3). Long-term data are not yet available.

Results:

All cases showed successful preservation of buccal root fragments, with reduced operative time and improved surgical control based on the author's clinical experience. Radiographs and clinical assessments demonstrated stable peri-implant bone levels, maintained ridge contours, and indicated satisfactory esthetic outcomes. No complications, such as shield mobility or adjacent root damage, were reported.

Conclusions:

The guided trephine-based socket-shield technique may offer advantages over conventional SST in terms of precision, reproducibility, and reduced chair time. However, the present report is limited by the inclusion of only three cases with very short follow-up periods. Although early results appear to be stable both functionally and esthetically, the technique requires validation through larger, well-controlled studies to confirm its reliability and efficiency, thereby supporting wider adoption by clinicians.

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sciforum-142348: Prosthetic Management in Patients with Sjögren's Syndrome: Challenges, Biomaterials, and Pharmacological Considerations

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Introduction:

Sjögren's syndrome (SS) is a chronic autoimmune disorder characterized by lymphocytic infiltration of exocrine glands, leading to profound hyposalivation, xerostomia, and mucosal fragility. These pathophysiological changes pose significant challenges to prosthetic rehabilitation, including poor prosthesis retention, mucosal trauma, and increased susceptibility to infections.

Methods:

We conducted a narrative review using PubMed, Scopus, and Web of Science, including clinical studies, systematic reviews, and case series (minimum 6-month follow-up), published in English between 2000 and 2024. Studies were selected based on their focus on prosthetic strategies—both tissue-supported and implant-supported—in SS patients. Exclusion criteria included animal studies and those not directly addressing prosthetic or pharmacological considerations.

Results:

Tissue-supported prostheses are often compromised by poor lubrication and mucosal ulceration, limiting their long-term use. In contrast, implant-supported prostheses, such as overdentures or fixed implant restorations, demonstrate superior performance in retention, patient comfort, and masticatory function. Digital technologies (e.g., CAD/CAM and 3D printing) improve adaptation and reduce surface roughness. Polished, low-porosity acrylic resins reduce microbial colonization, and bioactive coatings (antifungal, antimicrobial) are emerging as adjunctive options. However, current evidence is largely derived from case series and observational studies, underscoring the need for controlled trials.

Conclusions:

An integrated, multidisciplinary approach is essential. Besides careful prosthetic planning and biomaterial selection, pharmacological interventions (sialogogues, antifungals, remineralizing agents) are critical for managing xerostomia and its consequences. Long-term follow-up protocols, including periodic relining, hygiene reinforcement, and management of peri-implant health, are crucial for implant longevity. Future research should explore implant survival rates in SS, biomaterial innovations with mucosa-friendly interfaces, and personalized protocols for maintenance and oral microbiome modulation. Prosthetic success in SS hinges on precision, prevention, and collaboration.

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sciforum-141680: Psychosomatic Bruxism and Dental Implant Complications

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Introduction: Bruxism is increasingly recognized as a psychosomatic condition mediated by stress, anxiety, and sleep disturbances, generating sustained non-physiological occlusal forces that compromise the stability and longevity of dental implants. This narrative review with integrated pilot data synthesizes the causal pathway linking psychological factors to bruxism and its impact on implant outcomes, advocating for an interdisciplinary model of prevention and management.

Methods: A narrative review was conducted using PubMed, Scopus, and Cochrane Library (2000–2025) with keywords including bruxism, dental implants, psychosomatic, stress, anxiety, sleep, biomechanics, implant failure, digital dentistry, artificial intelligence, and interdisciplinary management. Peer-reviewed clinical studies, case series, and technical reports were analyzed. Inclusion criteria were studies addressing psychosomatic or biomechanical aspects of bruxism in relation to implants; exclusion criteria were non-peer-reviewed or non-clinical reports. Pilot data from 15 patients with bruxism and implant-supported restorations (12-month follow-up) were reviewed, integrating psychological assessment, dental examination, and sleep medicine evaluation. Digital tools, including finite element analysis and AI-based occlusal monitoring, were considered.

Results: Evidence shows a strong association between psychosocial stress, anxiety disorders, and sleep disturbances with bruxism. Mechanical complications (screw loosening, veneer and framework fractures) and biological complications (peri-implant bone loss, implant failure) were identified. Early studies indicate that intraoral force sensors, AI-based scan analysis, and polysomnography enable the early detection of overload and prosthetic compromise. Interdisciplinary interventions—occlusal splints, cognitive-behavioral therapy, stress reduction, and sleep medicine—reduce complications. Studies remain small and heterogeneous; consistent trends support the association between psychosocial stressors, bruxism, and implant outcomes.

Conclusions: Psychological determinants threaten implant survival via biomechanical overload. Proactive management requires interdisciplinary collaboration. The proposed model—integrating dentists, psychologists, and sleep medicine physicians, supported by digital monitoring—represents not only a clinical recommendation but also a research agenda. Future randomized trials and validation of AI tools are essential to strengthen evidence and improve long-term outcomes.

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sciforum-144349: Structural, Mechanical, and Biological Characterization of Polycaprolactone (PCL) Scaffolds for Dynamic Cell Cultures, Toward Dental Applications

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Introduction

Alveolar bone loss after tooth extraction is a challenge for predictable implant placement. Bone grafting is widely used but limited by resorption, availability, and donor site morbidity. Biomimetic scaffolds with engineered structural, mechanical, and biological properties offer alternatives by supporting cell adhesion, proliferation, and tissue formation. Polycaprolactone (PCL), a biodegradable polymer with established biocompatibility, is widely applied in tissue engineering. This study examined the effect of PCL concentration on scaffold properties relevant to alveolar bone regeneration.

Methodology

Scaffolds were fabricated using Thermally Induced Phase Separation (TIPS) with PCL dissolved in a THF/water solvent at 8%, 9%, and 10% (w/w). Mechanical properties were assessed by compression testing at 1 mm/min and 25 °C. Morphology was examined by Scanning Electron Microscopy (SEM), and porosity measured with AccuPyc II. Biological performance was evaluated by MTT assay, where cells were incubated with MTT solution for 3 h at 37 °C before absorbance at 590 nm. Confocal microscopy was performed with MC3T3-E1 pre-osteoblast cells stained with Texas Red™-X Phalloidin (591 nm) and DAPI.

Results

The 9% PCL scaffold demonstrated the most consistent mechanical behavior, with a modulus ranging from 2.81 to 3.40 MPa. Statistical analysis (ANOVA, p 0.05) confirmed that the 9% PCL group had a significantly higher modulus than both 8% and 10%, while no significant difference was observed between 8% and 10%. SEM analysis revealed interconnected pore structures with porosity ranging from 84% to 87%, supporting tissue ingrowth. The MTT assay confirmed good cell viability across all groups, with the 9% PCL group nearly matching the control. Cytotoxicity remained low (0.31%–8.50%), with the 9% showing the lowest value and the 8% group the highest. Confocal microscopy, after seeding 100,000 cells (MC3T3-E1) per scaffold, showed strong cell attachment and penetration, indicating effective scaffold–cell interaction.

Conclusion

The 9% PCL scaffold demonstrated optimal mechanical stability and biological performance, making it a promising candidate for alveolar bone regeneration. Nevertheless, in vivo validation is required to confirm translational potential.

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sciforum-142909: Systematic Review of CAD/CAM-Fabricated Customized Healing Abutments and Their Effect on Soft Tissue Esthetics

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Introduction:

Immediate implant placement provides clear clinical benefits, including reduced treatment time and preservation of alveolar bone structure [1,2]. Despite these advantages, achieving predictable and esthetic soft-tissue outcomes remains a consistent challenge. Customized healing abutments (CHAs), fabricated using computer-aided design and computer-aided manufacturing (CAD/CAM), are intended to better support peri-implant soft tissue compared to standard stock components [3,4]. Although initial findings are encouraging, the available evidence remains limited and inconsistent across studies [2]. This systematic review aims to assess soft-tissue esthetic outcomes associated with CAD/CAM-fabricated CHAs following immediate implant placement.

Methods:

A systematic search was conducted in PubMed, Springer Nature Link, and Wiley Online Library following PRISMA guidelines. Studies published in English within the past five years assessing soft tissue esthetic outcomes of CAD/CAM CHAs after immediate implant placement were included. Out of 145 articles screened, 5 met the inclusion criteria.

Results:

All five studies reported improved peri-implant soft tissue esthetics with CAD/CAM CHAs. High Pink Esthetic scores were consistently observed, with Elgendi et al. reporting a mean score of 9.64 ± 0.50 and full papilla fill at 12 months using PEEK CHAs [5]. Increases in mucosal thickness and keratinized tissue width were statistically significant in multiple studies (p 0.05) [2,3]. Long-term data from Akin and Chapple demonstrated preserved emergence profiles and no mucosal recession over 8 years in 115 posterior implants, indicating durable soft tissue outcomes. Buccal volume loss was significantly reduced (–4.76% ± 5.29%, p = 0.043) and overall dimensional stability was maintained, with minimal soft tissue changes reported across studies [1,3,6]. While sample sizes and methodologies varied, all studies demonstrated favorable esthetic outcomes with CHAs compared to conventional approaches.

Conclusion:

CAD/CAM-fabricated CHAs improve soft tissue esthetics in immediate implant placement by preserving volume, enhancing contours, and maintaining emergence profiles. Despite promising results, further standardized, long-term clinical trials are needed to validate these outcomes.

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sciforum-144108: Targeted delivery of miR-210 rosuvastatin in the treatment of periodontitis

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Differentiation of PDLSCs and the development of periodontal disease are closely connected with the stimulation of inflammatory factors. The cardiovascular system, immune system, and skeletal system can all be affected by Rosuvastatin, which is a selective inhibitor of 3-hydroxy-3-methylglutarate monoacyl coenzyme reductase. The NF-κB signaling pathway can regulate stem cells' differentiation ability and inhibit the secretion of inflammatory factors by stem cells, as confirmed by existing studies. Our research found that in the inflammatory microenvironment of periodontitis, rosuvastatin sustained release by the RS-PC scaffold can effectively up-regulate the expression of miR-210, target and bind to p65, inhibit the inflammatory response regulated by the NF-κB signaling pathway, and promote osteogenic differentiation. The purpose of this project is to clarify the impact of miR-210 on the function of the PDLSCs in periodontitis conditions and its possible pathway in the PDLSCs. It became apparent that rosuvastatin targets the NF-κB signaling pathway, which controls miR-210, suppresses the release of inflammatory factors, and promotes osteogenic differentiation. The rosuvastatin in the RS-PC scaffold has been tested in animal experiments to investigate its sustained-release, anti-inflammatory, and alveolar bone repair abilities. The research findings offer a theoretical basis for investigating the mechanism behind periodontitis' occurrence and treatment methods.

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sciforum-125106: The importance of design and restorative materials in implant prosthetics for reducing the risk of peri-implant bone loss

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The success of an implantological rehabilitation is determined by multiple surgical factors (implant position, implant distribution, number of implants, implant size, bone and gingival regeneration...), patients' personal factors (general health, oral hygiene, hereditary factors, previous periodontitis, smoking, bruxism...), and prosthetic factors (restorative materials and prosthesis design).

It is on this last point that we are going to focus because, despite being of vital importance, it is the least publicized and explained. Among the different points that can intervene in the design of the prosthesis, such as the emergence profiles, the spaces to facilitate hygiene, the design of the pontics, the length and shape of the transepithelial abutments... there are some that affect edentulous mandibular patients: mandibular flexion, weight of the prosthesis, impact against the antagonist, and the importance of the design of the prosthesis and the restorative material.

It is well known that there is a flexion, a deformation of the mandible when the person opens the mouth and/or protrudes, but what is not well known is the problems it causes to the prosthesis and the implants if a correct design and a good choice of the restorative material are not made. Among the most known problems are: fracture of the prosthesis, loosening of the screws, pain and/or dysfunction during opening or protrusion, peri-implant bone loss and loss of the implants.

By means of photographs, radiographs and numerous references, we will review the existing problems and provide different solutions, both in terms of design and restorative materials, to reduce the risk of prosthesis and/or implant failure in these edentulous mandibular patients.

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