VOL. 3

SCHOOL OF DENTAL MEDICINE

ANNUAL RESEARCH SYMPOSIUM

MARCH 3, 2026
STUDENT ACTIVITIES CENTER
STONY BROOK UNIVERSITY

Stony Brook
School *of* Dental Medicine

Table of Contents

Table of Contents

RESEARCH PRESENTATIONS

19 | Soffi Miller
Irrigation Effects on Zirconia Implant Surface Wettability

20 | Colleen O'Connor
Neurotoxicity Associated with Titanium Particles from Dental Implants: Systematic Review

21 | Tawhida Oishi
Dental Explorer Blunting: Implications for Detection of Open Margins

22 | Danielle Rallis
Elemental Analysis of Ocular Tissues in Patients with and without Dental Implants

23 | Amanda Rappa
Multifactorial Causes of External Apical Root Resorption: A Comprehensive Systematic Review

24 | Sherrina Rose
General Anesthesia for Dental Rehabilitation in a Pediatric Patient with Sickle Cell Disease: A Case Report

25 | Luke Tzagournis
Successful Treatment of Proliferative Verrucous Leukoplakia with Topical Imiquimod

26 | Anaya Zaineb
Wettability of Titanium Implants Utilizing Hyaluronic Acid and Bone Grafts

YEAR 4 DENTAL STUDENTS

27 | Ahmed Abdullah
Soft Tissue Nodule of Gingiva: A Case Report and Review of Differential Diagnosis

28 | Lauren Brown
Navigating CODA Standards on Nutrition Counseling: Interactive Ideas to Implement

29 | Chien-Yi (Angela) Chou
Morphologic Analysis of Metal Particle Release Following TAD Insertion

30 | Courtney Hakimian
The Role of Vibration in Orthodontic Movement and Bone Metabolism: A Review

31 | Eve Pomazi
Tooth Bound Edentulous Site Restorations at the SBUDCC

RESIDENTS

32 | Brett Allen, DDS
Effect of Surface Treatments on Bonding Strength to CAD/CAM Acetal Resin: An In-vitro Study

33 | Anthony Allison, DDS
The Slot Height and Dimensional Accuracy of 3D-Printed Zr-Based Brackets

34 | Simone DeBellis, DDS
Emergent Needs Prior to General Anesthesia: Variations for SHCN

35 | Brandon Fitzgerald, DMD
Ct Airway Volume and Area Derived from Readily-Available Viewer Software – Can They Help Predict Difficult Laryngoscopy and Intubation in Surgical Patients?

36 | Ryan Grove, DDS
Optimization of MRI Acquisition Parameters and Implant Orientation to Reduce Titanium Dental Implant Artifacts

37 | Aria Hourizadeh, DDS
Desquamative Gingivitis: A Case Report

38 | Sahana Kamisetty, DDS, and Judy Chen, DDS
In Vivo Evaluation of the Regenerative Potential of an Innovative Injectable and Retrievable Drug Delivery System for Endodontic Therapy Using a Canine Model

39 | Jinha Kim, DDS
Deep Learning–Based Segmentation of Arterial Calcifications in Dental CBCT: Validation with an Expanded Dataset and Analysis of Image Quality and Calcification Size Effects

Table of Contents

MASTER'S STUDENTS

UNDERGRADUATE STUDENTS

Schedule of Events

Breakfast **8am**
Ballroom B

Welcome and Introductory Remarks **8:45am**
Stephen G. Walker, MSc, PhD
Associate Professor
Interim Associate Dean of Research
Sidney Gelber Auditorium

Introduction of Keynote Distinguished Lecturer **8:50am**
Patrick M. Lloyd, DDS, MS
Dean and Professor
Stony Brook School of Dental Medicine
Sidney Gelber Auditorium

Keynote Address **8:55am**
Kyle Vining, DDS, PhD
Assistant Professor, Preventive and Restorative Sciences
School of Dental Medicine and Department of Materials Science
School of Engineering and Applied Sciences
University of Pennsylvania
Topic: "Engineering Biomaterials for Restoring Oral Health"
Sidney Gelber Auditorium

Poster Presentations and Judging **10:15am**
Vendor Forum
Ballroom A

Presentation of Awards **12:45pm**
Ballroom B

- *AADOCR/Dentsply Sirona Student Research Award*
- *Hinman Symposium Award*
- *AADOCR National Student Research Day Award*
- *AADOCR Long Island Section Student Research Award*
- *Omicron Kappa Upsilon Sigma Tau Chapter Research Award*
- *Resident/Fellow Research Award*
- *Graduate Student Research Award*
- *Undergraduate Student Research Award*

Lunch **1pm**
Ballroom B

Dean's Welcome

DEAN

PATRICK M. LLOYD, DDS, MS

Dear Colleagues,

How excited we all are to share with you the many ways our school is moving the dental profession forward through the research with which its students, residents and faculty are engaged. We are as well pleased to showcase the work they have completed with faculty from schools and colleges across our campus. It demonstrates the effectiveness our profession has in collaborating with others in making new discoveries and expanding the knowledge base of dentistry.

We are as well appreciative of the support provided by our symposium sponsors. Their willingness to provide the resources necessary for our students to be successful in the research they have conducted, and other educational initiatives that have helped them develop a spirit of curiosity, is something that will keep them up-to-date on developments in the profession throughout their careers.

I want to offer a collective note of gratitude for the time and effort expended by the faculty who mentored our poster presenters. Their evening and weekend commitments to help design experiments, carry out projects, contemplate findings and arrive at conclusions worth sharing with others, are what make this day possible and so rewarding for us all.

Today is a proud moment for everyone involved in or attending our symposium. It reflects favorably on our school, profession and university.

Sincerely,

Patrick M. Lloyd, DDS, MS

Research Dean's Welcome

INTERIM ASSOCIATE DEAN OF RESEARCH

STEPHEN G. WALKER, MSc, PhD

Dear Colleagues,

It is my pleasure to welcome you to the School of Dental Medicine's Annual Research Day and the Leo and Mickey Sreebny Lectureship.

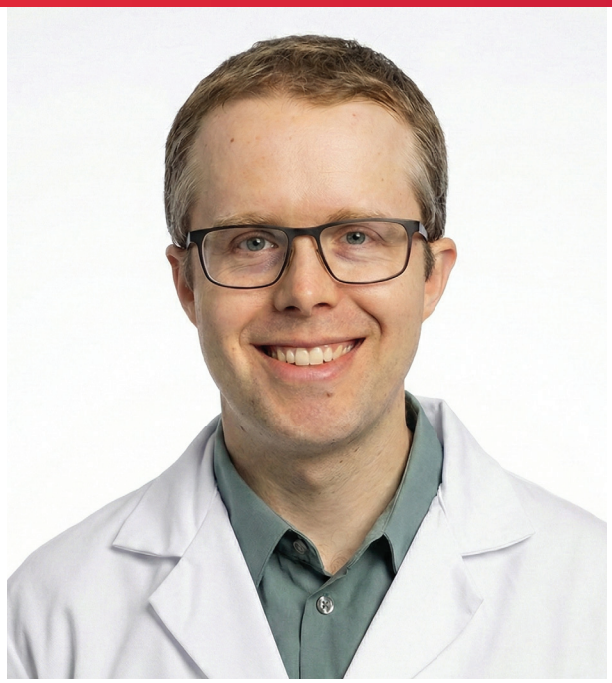
I extend my sincere thanks to the faculty, students and residents presenting their work today. Research advances our profession by generating new knowledge that directly informs and strengthens the practice of dentistry.

I am also grateful to Patricia Swanson, DDS, and Ms. Erin Boccio for organizing this event and to Mr. Brett Mauser for producing the program brochure. I look forward to the keynote address by Kyle Vining, DDS, PhD, our Sreebny Distinguished Lecturer, and to learning more about the innovative studies featured in today's poster presentations.

Sincerely,

Stephen G. Walker, MSc, PhD

About Our Speaker



SREEBNY DISTINGUISHED LECTURER

KYLE VINING, DDS, PhD

Dr. Kyle Vining is an assistant professor of preventive and restorative sciences in the School of Dental Medicine as well as the Department of Materials Science in the School of Engineering and Applied Sciences at the University of Pennsylvania. He earned his PhD in bioengineering from Harvard University, his Doctor of Dental Surgery from the University of Minnesota School of Dentistry, and Bachelor of Science in biomedical engineering from Northwestern University. Before joining Penn, he was a postdoctoral scientist at the Dana-Farber Cancer Institute. He also previously completed the Medical Research Scholars Program at the National Institutes of Health.

Dr. Vining is a member of the Center for Innovation & Precision Dentistry (CiPD) at Penn Dental Medicine and Penn Engineering, Abramson Cancer Center, Penn Center for Musculoskeletal Disease (PCMD), Institute for Regenerative Medicine, and an affiliate member of the Center for Engineering Mechanobiology (CEMB). His research has received extramural funding from the NIH/NIDCR through the Mentored Clinical Scientist Career Development Award (K08) and Pathway to Independence Award (K99/R00), the American Cancer Society Research Scholars Grant, the Hartwell Foundation Individual Biomedical Research Award, and the NIH/NIGMS MIRA R35 award. Dr. Vining also maintains an active clinical practice in restorative and cosmetic dentistry.

Featured Topic: Engineering Biomaterials for Restoring Oral Health

The Vining Lab aims to impact human health through studying mechanobiology and immune regulation. The lab develops biomaterials for tissue regeneration and investigates the mechanical regulation of inflammation in fibrotic niches. It employs material strategies to manipulate and study cell behavior in a broad range of physiologic and disease contexts, including dentin regeneration, hematopoietic and solid tumor malignancies, and fibrotic extracellular matrix. The lab also investigates new mechanisms of immuno-mechanobiology to understand how biophysical cues of tissue ECM regulate myeloid cell development and innate inflammation, as well as the role of biophysical cues on tumor growth and immunotherapy in oral cancer. Further, the Vining Lab develops new material technologies to target mineralized tissues for regeneration and immunomodulation.

REMEMBERING

Leo M. Sreebny, DDS, MS, PhD

Dr. Leo M. Sreebny, former dean (1975-1979) and faculty member (1975-2005) of Stony Brook School of Dental Medicine, passed away on April 5, 2020, from complications caused by COVID-19. Dr. Sreebny was a passionate advocate for research and innovation. He encouraged discovery for hundreds within our community through his establishment and generous support of the annual Leo and Mickey Sreebny Lectureship.

Dr. Sreebny's impressive career — spanning from his military service in World War II to his numerous academic papers — is worth celebrating. Personally, Dr. Sreebny was genuine and kind, known within our community for his warmth and his backing of our students and their academic pursuits, particularly in the name of research. It is a testament to his legacy that his namesake day of research will live on within the School of Dental Medicine.

Read more about the life and accomplishments of Dr. Sreebny at dentistry.stonybrookmedicine.edu/news/2020-DrSreebny.

Acknowledgments

THANK YOU TO THE SPONSORS OF TODAY'S EVENT

WE WOULD LIKE TO THANK THE FOLLOWING PEOPLE FOR THEIR CONTRIBUTIONS TO THIS EVENT

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Stony Brook
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Research Abstracts

2025-2026

01 | Leena Alzafarani

YEAR 1 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Dental-Induced Subcutaneous Emphysema and Cerebral Air Embolism: Systematic Review

Alzafarani, Leena M.; Li, Danny; Kollmer, William; Silva, Daniel A.[1]; Romanos, Georgios E.[1]
[1] Department of Periodontics and Endodontics

OBJECTIVES

This review evaluates the causes of subcutaneous emphysema (SCE) and cerebral air embolism (CAE) in dental practice, with the goal of raising awareness and providing recommendations to minimize their occurrence.

METHODS

A PubMed literature search for SCE was conducted using the algorithm: subcutaneous emphysema AND (dent* OR "oral surgery" OR periodont* OR implant* OR prosthodont* OR orthodont* OR endodont*) AND "case report". A similar but separate algorithm was used for CAE cases. Articles were excluded due to inaccessibility or language barriers.

RESULTS

The PubMed search for SCE yielded 83 results, 53 of which were evaluated. Ten cases were believed to be caused by air syringes, five of which occurred from drying canals. Twenty-one cases were believed to be caused by handpieces, and four cases were attributed to air abrasion for biofilm removal in periodontics. The PubMed search for CAE yielded seven results; the five that met inclusion criteria occurred following local anesthesia, extractions and air abrasion.

CONCLUSION

SCE and CAE should be a differential diagnosis when presented with soft tissue swelling or neurological manifestations, not only after dental extractions, but also after RCT, operative procedures and air-abrasion.

02 | Cindy Leung

YEAR 1 DENTAL STUDENT
Advisor(s): Ying Gu, DDS, PhD
Department of General Dentistry

A Chemically-Modified-Curcumin 2.24 Reduces Collagenase Levels in Human Monocytic Cells

Leung, Cindy; Ho, Isabella[1]; Lee, Hsi-Ling[1]; Johnson, Francis[2]; Golub, Lorne[1]; Gu, Ying[3]
[1] Department of Oral Biology and Pathology
[2] Department of Chemistry and Pharmacological Sciences
[3] Department of General Dentistry

OBJECTIVES

Matrix metalloproteinases (MMPs) including collagenases such as MMP-8 can degrade collagen in the extracellular matrix and alveolar bone, resulting in periodontitis progression. While chemically-modified-curcumin (CMC) 2.24 was previously shown to inhibit the levels of gelatinase MMP-9 in a periodontal-relevant human mononuclear cell model (THP-1), its effects on collagenases remain unexplored. In this present study, the inhibitory effect of CMC2.24 on collagenase levels in THP-1 cells was evaluated.

METHODS

THP-1 cells were cultured at 1×10^6 cells/mL in serum-free medium for 6 or 18 hours, with or without Escherichia coli LPS (50 ng/mL). Cells (n=4) were treated with 5 μM CMC2.24, CMT-3, or doxycycline. Conditioned media were collected and analyzed for collagenase levels via collagen zymography. A molecular weight ladder was used to determine the kDa of the protein band. Protein bands were quantified using ImageJ.

RESULTS

In prior studies, we demonstrated that CMC2.24 reduced LPS-induced gelatinase levels (MMP-9) in THP-1 cells. In the present study, based on the molecular weight standard, the collagenase detected in THP-1 cells was collagenase-2 (MMP-8) with a MW at 85 kDa. After 6 hours of incubation, LPS increased the MMP-8 levels by 95%. CMC2.24 decreased MMP-8 levels by 67.03% ($p < 0.01$), compared with reductions of 19.29% ($p < 0.01$) by CMT-3 and 54.08% ($p < 0.01$) by doxycycline. Similarly, at 18 hours, LPS increased the levels of MMP-8 by 143%. CMC2.24 reduced MMP levels by 66.77% ($p < 0.01$), while doxycycline achieved a similar reduction of 66.88% ($p < 0.01$).

CONCLUSION

CMC 2.24 significantly reduced the levels of MMP-8, in addition to previously demonstrated reduction of MMP-9 levels, in the same periodontally relevant cell culture system. This study further confirmed that CMC 2.24 is a highly pleiotropic compound with great therapeutic potential to reduce chronic inflammatory mediators in medical conditions such as periodontal diseases.

03 | Hannah Lloyd

YEAR 1 DENTAL STUDENT
Advisor(s): Rafael Delgado-Ruiz, DDS, MSc, PhD; Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Prosthodontics and Digital Technology; Department of Periodontics and Endodontics

Evaluation of the Capability of a Large Language Model for Smile Analysis and Smile Design Generation in the Anterior Esthetic Region

Lloyd, Hannah; Delgado-Ruiz, Rafael[1]; Romanos, Georgios E.[2]
[1] Department of Prosthodontics and Digital Technology
[2] Department of Periodontics and Endodontics

OBJECTIVES

To evaluate the capability of a large language model (LLM) to analyze smiles and generate smile designs based on prompts.

METHODS

This in silico, image-based study used smile photographs from publicly available sources. A large language model (ChatGPT-5.0) was configured using principles of dental esthetics and smile analysis. Twenty smile photographs were selected and cropped to include only the middle and lower facial thirds. Each image was uploaded to the LLM for a basic smile analysis. Evaluated parameters included tooth color, shape, dental symmetry and midline alignment. Subsequently, three distinct prompts were used to generate variations of smile designs for each photograph. Generated images were evaluated for generation time, smile improvement (including symmetry, lip characteristics and color changes), image realism and perceived clinical utility. Descriptive statistical analysis was conducted.

RESULTS

ChatGPT's esthetic analysis, while accurately identifying issues with tooth alignment, midline and shading, was often incomplete. In terms of image generation, all prompts generated more esthetic smiles with improvements in tooth color, symmetry and midline alignment. The first prompt, which did not include correction requests, generated the most realistic images. In contrast, the second and third prompts, which included specific requests for tooth shape, shade and midline correction, led to longer generation times and less realistic images. The AI often introduced unrequested changes that enhanced overall facial esthetics beyond the smile itself.

CONCLUSION

Within the limitations of this in silico image-based study, the ChatGPT LLM possesses limited capability for smile analysis and can generate smile designs within a short time with the first prompt. Additional prompts require longer times and lead to extensive image transformation associated with increased visual artifacts and reduced perceived naturalness.

COMMENTS

Clinical implications: Although additional testing and evidence are required, the ChatGPT LLM presents potential for assisting smile design and clinician–patient communication in restorative dentistry.

04 | Samuel Rabins

YEAR 1 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Ethnic and Racial Disparities in Clinical Outcomes of Periodontal Therapy: A Narrative Review of the Literature

Rabins, Samuel L.; Romanos, Georgios E.[1]
[1] Department of Periodontics and Endodontics

OBJECTIVES

It is thought that clinical outcomes from periodontal treatment may be influenced by racial and ethnic background, but that topic has not been investigated much until now. This review aims to examine differences in clinical outcomes of periodontal therapy across diverse ethnic and racial groups, specifically examining the results of surgical and non-surgical interventions.

METHODS

A search was conducted in three databases for articles discussing patients' responses to periodontal therapy and specifying patients' ethnicity, race and country of origin.

RESULTS

The initial search produced 1,656 articles, and after the title, abstract, and full-text review, this was reduced to 104 papers. Of those papers, 29 were used in this narrative analysis. The success of periodontal therapy appears to vary between different racial and ethnic groups. African American and Hispanic patients seemed to have smaller improvements in clinical attachment level and probing depth after treatment than White patients. Surgical therapy results were harder to find with some variation in treatment success between populations, possibly due to differences in tissue thickness and lifestyle factors. Despite strong prevention and universal health coverage, Japan maintains high rates of periodontal disease. While in other countries that have similar high access to care, like Sweden, periodontitis rates are lower. In most countries, there is a strong link between socioeconomic status and periodontal health, where higher status indicates better health outcomes.

CONCLUSION

There are many suggestions to help explain the differences in patient response to periodontal therapy. Because many elements play a role in periodontitis, it follows that populations with different traits can exhibit different responses to treatment. Increasing overall healthcare access is not enough to ensure everyone receives the best care possible. To ensure that patients are given the best care, treatments should be tailored to individual patients.

05 | Linda Cesark

YEAR 2 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Stability Improvement of Wide-/Short-Implant in Osteoporotic Bone In-vitro

Cesark, Linda; Khan, Haaris[1]; Anderson, Nina[1]; Romanos, Georgios E.[2]
[1] Department of Oral Biology and Pathology
[2] Department of Periodontics and Endodontics

OBJECTIVES

To evaluate the stability of wide- and short-implants in osteoporotic bone (type IV) under sizing osteotomies in vitro.

METHODS

Three different types of osteotomies were studied (n=20; total: 60) following the surgical protocol recommended by the manufacturer based on the incremental sequence of drills to the maximum of 5mm diameter (conventional), as well as under sizing the osteotomies with a final 4.5mm, and 4.0mm drill diameter. The implants (ø5.0x6mm, Hiossen Co.) were placed in osteoporotic bone by a calibrated clinician (L.C.) under standardized experimental conditions (drilling speed: 1,500RPM). The stability of the implants was evaluated by a different examiner (H.K.) using insertion torque (IT) with the surgical motor (Dentsply Sirona Frios Unit Si) and resonance frequency analysis (RFA) utilizing the Penguin device. The maximum torque required to insert the implants with their platforms leveled with the bone block surface was recorded in Newton Centimeter (Ncm). RFA values were recorded using a specific for this implant MulTipeg, attached within the implant body. Statistical analysis using multiple comparisons and one-way analysis of variance (ANOVA) were performed to compare differences between groups at significance level of $p<0.05$.

RESULTS

The mean IT values were as follows: 5.0mm drill diameter (20.7±2.45), 4.5mm diameter (25.7±2.94) and 4.0mm diameter (26.3±2.22). The mean values for RFA were as follows: 5.0mm diameter (49.4±11.53), 4.5mm diameter (48.7±11.59) and 4.0mm diameter (41.3±9.89). The multiple comparisons showed statistical significance difference between the 5.0mm diameter and both the 4.5mm- and 4.0mm-diameter group ($p<0.001$), respectively. No statistical significance was demonstrated between the groups for RFA values.

CONCLUSION

Implant stability of short- and wide-implants can be significantly improved in osteoporotic bone in vitro based on insertion torque (but not based on RFA) under sizing osteotomy diameter by one or two drills; no direct comparison between IT and RFA under these experimental conditions was found.

06 | Jessica Li

YEAR 2 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Data Collection Accuracy Based on Artificial Intelligence in Academia

Li, Jessica; Anderson, Nina K.[1]; Romanos, Georgios E.[2]
[1] Department of Oral Biology and Pathology
[2] Department of Periodontics and Endodontics

OBJECTIVES

Artificial intelligence (AI) websites are rapidly entering academia, including in research where they are used to explore scientific topics, explain concepts and analyze data; however, their accuracy remains uncertain. Occasionally, AI tools return incorrect information, underscoring the need to evaluate their reliability in returning quantitative data. One metric is publication counts, which are used to measure research productivity and involvement. This study analyzes the reliability of AI, using ChatGPT, in returning publication counts compared to human efforts through Web of Science, a bibliographic database.

METHODS

Ninety-two full-time faculty members in the professor or associate-professor rank from the periodontics and prosthodontics departments across 20 dental schools in the United States were randomly chosen. For each professor, the total number of publications on their Web of Science profiles were compared to those from ChatGPT when asked for their exact number of publications. A Q-Q plot and t-test were used to evaluate if the relative error was greater than 30%. To determine the distribution of relative errors, the professors were organized into 3 groups based on their h-index (0-10, 11-29, ≥ 30) and compared using the Kruskal-Wallis test.

RESULTS

ChatGPT's mean relative error was 58.33% with 48.39% of responses under 30% and 2.15% with 0% error. A Q-Q plot revealed an approximately normal distribution, and a t-test shows strong evidence that the true mean of relative errors is greater than 30% ($p < 0.001$). The 11-29 h-index group displayed the highest median relative error, but the Kruskal-Wallis test revealed insignificant differences across groups, consistent with the similar boxplot medians. Accuracy did not improve across h-index groups.

CONCLUSION

The results of this study suggest that ChatGPT is not accurate in providing precise information, like exact publication numbers and h-index information.

07 | David Parker

YEAR 2 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Silicone vs. Silicon/Silica in Intraoral Healing: A Systematic Literature Review

Parker, David; Bopardikar, Aditi; Romanos, Georgios E.[1]
[1] Department of Periodontics and Endodontics

OBJECTIVES

In the oral environment, silicone (polysiloxane) supports healing by creating low-permeability interfaces that limit microleakage. By contrast, silicon/silica systems support healing via hydroxyapatite nucleation. We aimed to clarify translational differences between animal models and humans, and to synthesize human evidence comparing silicone versus silicon/silica for interfacial bond formation and intraoral healing. Periodontal (PD, CAL, radiographic fill) and endodontic (PAI) outcomes were evaluated.

METHODS

A systematic review (1990–September 2025) building on a PRISMA-based review that screened 115 records; 14 clinical studies of bioactive glass (BAG) met inclusion (PRISMA). Data included model (in vitro/animal/human), test medium (saliva/simulated body fluid [SBF]), site (periodontal/endodontic) and outcomes for apatite formation, soft/hard tissue healing, ion release and measures (CAL, periapical healing, PD). For validity, saliva chemistry/flow and mechanical loading were considered. Endpoints were time-to-apatite and CAL/PD change, with secondary endpoints including ion-release kinetics.

RESULTS

Bioactive behavior is reported with degradable silicon/silica constructs, dissolution yielding ortho silicic acid (± magnesium or lithium), accelerates apatite nucleation and supports immunomodulatory/osteogenic responses that may support regeneration of periodontal ligament, cementum and bone in preclinical models. In humans, 14 BAG trials showed periodontal benefit versus controls in intrabony defects (PD decreased/CAL increased, radiographic fill increased). For endodontic healing, a multicenter randomized clinical trial (RCT) found PAI improved at 12 months with no significant between-groups difference. Differences in saliva composition/flow, masticatory loading and defect size/geometry likely explain attenuation of animal-model successes in human settings.

CONCLUSION

The literature supports a functional split: silicone = sealing (permissive healing); silicon/silica = signaling + interfacial bonding (regenerative healing). To advance translation, prioritize saliva-relevant assays reporting time-to-apatite and ion-release kinetics, incorporate loading and launch early-phase human studies to confirm durability and clinical benefit.

08 | Sooraj Shah

YEAR 2 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent; Katherine G. Jonas, PhD
Department of Periodontics and Endodontics; Department of Psychiatry and Behavioral Health

Placement of Dental Implants and other type of Implantations in Patients with Schizophrenia: A Review

Shah, Sooraj; Jonas, Katherine[1]; Romanos, Georgios E.[2]
[1] Department of Psychiatry and Behavioral Health
[2] Department of Periodontics and Endodontics

OBJECTIVES

The treatment of patients diagnosed with schizophrenia exhibiting failing dentition with dental implant placement is understudied. Various factors play a role in treatment success, ranging from bone density to psychiatric symptoms, antipsychotic medication, or compromised oral hygiene. We reviewed existing literature on dental implant placement in individuals with schizophrenia, resulting in three positive cases of four total studies. Non-dental implant placement was also reviewed.

METHODS

Google Scholar and PubMed searches were conducted to identify articles related to dental implant placement and schizophrenia published between January 2000 and March 2025 yielding four plausible studies. Six studies in a secondary search included procedures involving the direct placement or removal of a foreign object within individuals with schizophrenia.

RESULTS

The presented case reports show that dental restoration efforts in patients with schizophrenia can be completed, but there is variability in which patients can be treated. In the two positive cases reported by Castellano-Cosano et al.14 and Choi et al.15, the patients were successfully treated. Still, in the study by Niazi et al.16, treatment could not be achieved due to persistent psychotic symptoms. The following six cases presented non-dental related procedures to understand the reaction of individuals with schizophrenia to internal foreign object placement (trigger) and relate this methodology to dental implants. We examined upper-arm contraceptive implant placements, total hip and knee arthroplasty surgeries, cochlear implant placements and BMT treatment.

CONCLUSION

Implant treatment planning must account for the medical, psychiatric and logistical challenges commonly encountered in this patient population. Medical comorbidities of schizophrenia and antipsychotic treatments further increased the risk of dental problems. Negative symptoms associated with schizophrenia likely impact dental hygiene and post-operative care. If symptoms are well-managed, dental implant procedures can be performed successfully. Working with a psychiatrist alongside the dentist is crucial to this process.

09 | Astrid Bucaro

YEAR 3 DENTAL STUDENT
Advisor(s): Ana Carolina Botta, DDS, MS, PhD
Department of General Dentistry

Dental Students' Perception About Different Types of Magnification Loupes

Bucaro, Astrid; Pazos, Júlia Margato[1]; de Abreu Silva, Jessica Katarine[1]; Petromilli Nordi Sasso Garcia, Patrícia[1]; Amarillas Gastelum, Clarisa[2]; Botta, Ana Carolina[2]
[1] Department of Social Dentistry, São Paulo State University (UNESP), School of Dentistry, Araraquara – Sao Paulo, Brazil
[2] Department of General Dentistry

OBJECTIVES

This study aimed to evaluate dental students' perception about different types of magnification loupes.

METHODS

This was a cross-sectional, quali-quantitative observational study with a non-probabilistic sampling design. The sample consisted of first- and second-year predoctoral students from Stony Brook University, School of Dental Medicine (n=33). Initially, participants performed manual dexterity tasks under four visual conditions: naked eye, Galilean loupes at 2.5× and 3.0× magnification, and an Ergonomic loupe at 3.0× magnification. Immediately after completing each one of the tasks, the, students filled out a survey with four questions each to identify their level of comfort and visual fatigue, and how easy it was for them to adapt and work under each one of the visual conditions. Each question was accompanied by a visual analog scale on which participants were asked to quantify their perception. Below each scale, there was a open-text field for qualitative comments, allowing students to freely describe their impressions. To analyze the quantitative responses, descriptive statistics were done and, after verifying the assumptions of normality and homoscedasticity, a one-way repeated measures ANOVA with the Bonferroni's post-test (α=0.05) was performed. The qualitative responses were analyzed based on the quali-quantitative technique of the Collective Subject Discourse (DSC).

RESULTS

Students reported the easiest adaptation and performance, and the most comfort when working without magnification. No statistically significant differences were found among the four conditions regarding visual fatigue. Among the magnification options, the ergonomic loupe received the lowest ratings across all domains except for visual fatigue.

CONCLUSION

Dental students felt most comfortable and easy to adapt and work without any magnification. The ergonomic loupe was considered the least favorite by the students in terms of usability, adaptation and comfort.

10 | Sheryl Francis

YEAR 3 DENTAL STUDENT
Advisor(s): Dan Colosi, DDS, PhD
Department of Prosthodontics and Digital Technology

Radiomic Feature Changes with CBCT Detector Temperature: A Preliminary Study

Francis, Sheryl; Kollmer, William; Colosi, Dan[1]
[1] Department of Prosthodontics and Digital Technology

OBJECTIVES

CBCT image quality is influenced by equipment performance parameters, including flat-panel detector temperature. Temperature-related changes in image characteristics have been described 1, 2, but downstream effects on quantitative radiomics features remain unclear. This preliminary study evaluated whether differences in detector temperature (warmed vs. cool state) produce measurable differences in radiomic feature values.

METHODS

A quality-assurance (QA) phantom (Imaging Sciences International, Hatfield, PA) was scanned on an i-CAT FLX CBCT unit (Imaging Sciences International, Hatfield, PA) using a fixed acquisition protocol at two different detector temperatures: (1) cool detector immediately after system start and (2) warmed detector after approximately 8 hours of continuous on-state and intermittent operation. Scans for each condition were performed three times (n = 3). A homogeneous high-density insert was segmented from each QA phantom image with 3D Slicer software3 using a grey-value threshold of 300.00. Radiomic features were extracted using SlicerRadiomics3 with standardized settings. Feature values were averaged across repeated scans to identify features demonstrating the largest absolute percent differences. Given the preliminary sample size, analysis was qualitative.

RESULTS

Radiomic feature values showed minimal variability across repeated scans within each detector temperature state. Several texture-based features demonstrated clear differences between cooled and warmed detector conditions. The largest relative differences were observed for gldm_LargeDependenceLowGrayLevelEmphasis (~63%), glrlm_LongRunLowGrayLevelEmphasis (~43%) and gldm_LowGrayLevelEmphasis (~34%). Feature values were tightly clustered within each condition, indicating distinction between detector states.

Radiomic Features Demonstrating Greatest Temperature Sensitivity. Values rounded to the nearest hundredth.

	Radiomic Feature Cool Detector – Mean (Individual Values)	Warmed Detector – Mean (Individual Values)	Absolute Percent Difference
gldm_LargeDependence LowGrayLevelEmphasis	0.29 (0.29, 0.29, 0.30)	0.48 (0.47, 0.48, 0.48)	63%
glrlm_LongRunLow GrayLevelEmphasis	0.03 (0.03, 0.03, 0.03)	0.05 (0.05, 0.05, 0.05)	43%
gldm_LowGray LevelEmphasis	0.02 (0.02, 0.02, 0.02)	0.03 (0.03, 0.03, 0.03)	34%

CONCLUSION

Radiomic features most sensitive to detector temperature reflect gray-level texture characteristics related to the uniformity and connectedness of low-attenuation regions. These properties correspond to image characteristics clinicians interpret when evaluating trabecular bone patterns and subtle hypoattenuating areas on CBCT. Warmed detector scans demonstrated texture features consistent with more continuous hypoattenuating regions, whereas cooled detector scans appeared more granular. These findings suggest that detector temperature may influence quantitative texture descriptors of clinically relevant anatomic features, with possible implications for longitudinal imaging and radiomics-based analysis.

11 | Erin Gal

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Medical Cannabis and Oral Soft Tissues: A Literature Review

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[1] Department of Periodontics and Endodontics

OBJECTIVES

This review critically evaluates the current peer-reviewed evidence on the effects of medical cannabis–derived cannabinoids (CDC), with particular emphasis on cannabidiol (CBD), on oral soft tissues. The aim was to distinguish experimentally supported findings from speculative claims, assess biological plausibility and safety considerations, and identify evidence gaps that limit clinical translation in dentistry.

METHODS

A comprehensive literature search was conducted across library searches for studies published between January 2000-2026. Search strategies employed combinations of different MeSH keywords and manual screening. Inclusion criteria encompassed peer-reviewed original research, systematic reviews, preclinical and clinical studies, and case reports examining CDC-effects on oral soft tissues. Google Scholar results were screened through the first 5,127 records to capture studies specifically addressing medical cannabis and soft tissue outcomes.

RESULTS

Preclinical and limited clinical evidence indicates that CBD exerts biologically relevant effects on oral soft tissues through modulation of inflammatory signaling, wound healing processes and mucosal immune responses. In vitro studies demonstrated enhanced proliferation and migration of fibroblasts and dental pulp–derived cells, suppression of pro-inflammatory cytokines, activation of antioxidant pathways and antimicrobial activity against pathogens, primarily via CB2-associated signaling and downstream MEK/ERK- and PI3K/AKT-pathways. Animal models showed reduced inflammatory burden in oral wounds, although acceleration of wound closure was inconsistent. Clinical evidence remains limited; however, randomized trials reported improvements in gingival inflammation with topical CBD and analgesic patterns comparable to standard non-opioid therapy following tooth extractions. No clinical trials have evaluated CBD use following dental implant placement or soft tissue grafting, and dose-dependent biphasic effects observed highlight the need for cautious translation.

CONCLUSION

CBD demonstrates biologically plausible effects on oral soft tissues; however, current clinical evidence is limited and insufficient to support routine dental applications. Well-designed, clinical trials are required to determine safety, efficacy and translational relevance of CBD in oral soft tissue management.

12 | Karolina Grodzki

YEAR 3 DENTAL STUDENT
Advisor(s): Rekha Reddy, DMD; Mitchell Steinberg, DDS, MD; Kimberly Patterson, DDS, MS
Department of Oral and Maxillofacial Surgery; Department of Orthodontics and Pediatric Dentistry

The Fourth P? Peripheral Odontogenic Fibroma in a Pediatric Patient

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OBJECTIVES

Peripheral odontogenic fibroma (POdF) is a rare, benign, soft tissue tumor of odontogenic origin. It most commonly affects individuals between the fourth and fifth decades of life with a predilection for females. POdF presents exclusively on the gingiva as a fixed, firm mass either pink or red in color, typically on the mandible, with no significant radiographic changes. Its clinical presentation closely resembles other reactive gingival lesions, making diagnosis challenging without histopathologic evaluation. This report explores the significance of POdF in pediatric patients, importance of diagnosis in this population including differential diagnoses and recommended treatments.

METHODS

An 8-year-old male was referred for evaluation of delayed eruption of tooth #3. Clinical examination revealed hyperplastic tissue on the right posterior maxillary attached gingiva in the area of the unerupted tooth, without signs of ulceration, erythema, or infection. Radiographic assessment showed approximately 75% root development of tooth #3, with normal eruption and occlusion of the contralateral tooth #14. An incisional biopsy was performed under general anesthesia due to the patient's anxiety and history of attention-deficit/hyperactivity disorder.

RESULTS

Histopathologic examination revealed scattered islands of inactive odontogenic epithelium within a fibromyxoid stroma, consistent with a diagnosis of peripheral odontogenic fibroma. No significant radiographic changes were associated with the lesion.

CONCLUSION

Although rare in pediatric patients, peripheral odontogenic fibroma should be considered in the differential diagnosis of gingival lesions associated with delayed tooth eruption. Definitive diagnosis requires histologic evaluation, as clinical features alone are nonspecific. Early identification and appropriate surgical management are essential to ensure optimal outcomes in pediatric patients.

13 | Elizabet Isayeva

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Effects of Radiation Therapy on Bone: An Updated Literature Review

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OBJECTIVES

To provide an updated comprehensive review on the effects of high dose ionizing radiation on bone using in vivo studies published between 2000 and 2025.

METHODS

PubMed and Google Scholar search using key words "radiation therapy and bone." Narrowed search to in vivo studies including clinical trials, observational studies, and experimental studies published between 2000 and 2025. Excluded irrelevant results and review papers. Excluded papers that explicitly focused on combination chemo/radiotherapy.

RESULTS

A total of 30 studies were included. The most highly reported complications observed were fractures, failure of reconstructive grafts or implants, and osteoradionecrosis. Osteomyelitis is a less widely documented complication. Except for ORN, which is more common in the mandible, most complications are uniform between different anatomical sites. Histomorphometry demonstrates an alteration in bone turnover and bone mineral density as well as changes in vascularity and evidence of an active inflammatory process. The documented timelines at which alterations occur differ between studies. Most studies involve high radiation doses of 50 Gy or more. Most radiation regimens in human subjects are fractionated while animal studies tend to use single dose exposures. All included studies utilized external beam delivery- some featured radiation therapy alone, while others used RT as an adjuvant to surgery.

CONCLUSION

Human studies are generally consistent with animal study derived data. Ionizing radiation at doses used for oncologic therapy have an adverse effect on bone and predispose to complications. Histomorphometric analyses support the proposed fibro-atrophic theory. Available studies generally include small sample sizes and are mostly observational with highly variable radiation regimens making results difficult to generalize and guidelines difficult to standardize. Research is emerging but is sparse on potential preventive therapies to mediate bone related side effects. There still is not a consensus on whether microscopic adverse effects improve or worsen with increased time after radiation exposure.

14 | Naseerah Juman

YEAR 3 DENTAL STUDENT
Advisor(s): Ana Carolina Botta, DDS, MS, PhD
Department of General Dentistry

Impact of Dental Loupe Magnification and Manufacturer on Ergonomics and Tooth Preparation Quality

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[2] Department of General Dentistry

OBJECTIVES

This study aimed to assess the effect of different commercial brands of dental loupes and their magnification systems on the working posture and quality of preclinical tooth preparations.

METHODS

An experimental laboratory study was conducted. The response variables were: 1) angular deviation of the neck; 2) working distance; and 3) quality of tooth preparation. The independent variables were the dental loupe brands (LumaDent, Design for Vision, Univet and Q-Optics) and type of magnification (naked eye, Galilean 2.5x, Galilean 3.0x and Ergonomic 3.0x). Class I tooth preparations were performed on artificial maxillary left-first molars in a dental mannequin (n=10, N=110). Angular deviations were measured using the Software for Postural Assessment and the working distance was measured using the Measure App. The quality of tooth preparations was assessed using the Class One Cavity Preparation Assessment method. Descriptive statistics were performed, and after verifying the assumptions, confidence intervals were created allowing comparisons between the means (α=.05).

RESULTS

All magnification systems, regardless of their brands, promoted a greater working distance and a lower angular deviation of the neck compared to the naked eye. The Ergonomic loupes offered greater working distance and reduced angular deviation compared to the Galilean loupes. There was no statistical difference between both the Ergonomic loupes tested and among all the Galilean loupes tested. The quality of the tooth preparations was similar when done with naked eye and all magnification systems, regardless of their brands.

CONCLUSION

The working posture was more affected by the type of magnification system used, rather than their commercial brands. Ergonomic loupes, regardless their brands, provided the lowest angular deviation of the neck and the longest working distance, improving significantly the working posture. The quality of the tooth preparations was not affected by the dental loupe brands and their magnification systems.

15 | Kawalpreet Kaur

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Existing Periodontal Maintenance Protocols in the Literature During Orthodontic Therapy

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OBJECTIVES

This study evaluated whether orthodontists are adhering to appropriate phasing and sequencing protocols to ensure patients have periodontal health throughout fixed orthodontic treatment.

METHODS

Databases were searched from 2005 to October 2025 using a combination of the following keywords: fixed orthodontic appliances, periodontal disease, periodontitis, gingivitis, plaque control, adolescents, adults, prophylaxis and scaling and root planing. Reviews and articles assessing periodontal effect were excluded.

RESULTS

Fourteen articles were included. Nine articles reported periodontal maintenance protocols were performed on adolescents, five on periodontally healthy and four on periodontally compromised. Five articles reported periodontal maintenance protocols were performed on adults, four on periodontally healthy and one on periodontally compromised.

CONCLUSION

Periodontal maintenance was not significantly emphasized in orthodontic journal articles. Of the 259 articles, only fourteen orthodontic articles mentioned that plaque control was part of the protocol before or during fixed bracket placement. Additionally, most orthodontic articles addressing periodontal maintenance protocols emphasized the periodontal effects.

16 | Simran Kohli

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Effects of Curcumin on Implant Surface Wettability

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OBJECTIVES

The goal of this in vitro study was to assess the impact of curcumin on the wettability of implant surfaces.

METHODS

Titanium disks (machined Cp-Ti, Ti-SLA, machined Ti-alloy), zirconia (SDS) and titanium/ceramic surfaces (Cerid®) (n=20) were subjected to four liquid solutions (saline, distilled water, laboratory-produced curcumin solution 0.6 µg/100mL and dextrose). A static droplet of each solution was placed on each type of implant surface with the use of a goniometer (total: 800 contact angle measurements). Statistical analyses were conducted with ANOVA and post hoc to determine statistically significant differences at the 0.05 level between and within the groups of implant surfaces and liquid solutions.

RESULTS

Wettability exhibited variation with both the implant surface and solution types. On Cp-Ti, saline (77.26°) had significantly greater hydrophilicity compared to the other three solutions ($p < 0.05$). On Ti-SLA, curcumin showed the lowest wettability (89.74°), whereas saline (76.27°) significantly showed the greatest wettability, compared to distilled water and curcumin ($p < 0.05$). On Ti-alloy, saline (75.74°) also presented with significantly greater wettability compared to distilled water, curcumin and dextrose ($p < 0.05$). On zirconia surfaces, dextrose presented the smallest average contact angles (69.03°) and greatest wettability, compared to distilled water and dextrose ($p < 0.05$). On titanium/ceramic composite surfaces, distilled water (74.17°) had significantly improved wettability compared to saline and dextrose ($p < 0.05$). Curcumin most improved wettability on the zirconia (74.86°) compared to Cp-Ti, Ti-SLA and Ti-Alloy ($p < 0.05$).

CONCLUSION

Irrigation solutions proved to influence the wettability characteristic of implant surfaces. More specifically, curcumin improved the wettability on zirconia surfaces.

17 | Vincent Lactaoen

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

In-vitro Assessment of Implant Stability in Simulated Osteoporotic Bone

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OBJECTIVES

Evaluate differences in primary stability of two tapered implant designs inserted by experienced and novice clinicians in simulated normal density (D3) and very low-density bone (D5).

METHODS

A total of 160 implants were placed by a novice (N) and an expert (E) clinician in polyurethane foam blocks simulating normal (D3) and osteoporotic (D5) bone (Misch Classification). Two implant macro-designs with identical dimensions (3.75 mm × 10 mm) were used: a tapered slim-apex design (BLC, Straumann®) and a dynamic condensing design (BLX, Straumann®). Implants were placed equicrestally following manufacturer protocols across experimental groups defined by operator experience, bone density and implant design. Insertion torque (IT) and implant stability quotient (ISQ-values, Osstell®) were recorded by an independent examiner. Data analysis using independent samples t-tests for statistical significance at $p<0.05$.

RESULTS

Results: The IT and ISQ values in the representative bone qualities for both clinicians including implant designs were as follows.

D3 bone:
N-BLC: IT = 28.25 ± 2.447 Ncm; ISQ = 54.15 ± 4.498
E-BLC: IT = 29.75 ± 1.118 Ncm; ISQ = 57.83 ± 2.123
N-BLX: IT = 23.50 ± 4.617 Ncm; ISQ = 54.58 ± 5.109
E-BLX: IT = 24.50 ± 1.539 Ncm; ISQ = 60.35 ± 1.889

D5 bone:
N-BLC: IT = 11.25 ± 3.193 Ncm; ISQ = 36.63 ± 5.555
E-BLC: IT = 11.50 ± 2.351 Ncm; ISQ = 44.30 ± 2.839
N-BLX: IT = 11.75 ± 2.447 Ncm; ISQ = 39.35 ± 8.628
E-BLX: IT = 10.50 ± 1.539 Ncm; ISQ = 45.13 ± 2.420

(D3)N-IT (BLC/BLX) < 0.001; (D3)E-IT(BLC/BLX) < 0.001
(D3)E-ISQ (BLX/BLC) < 0.001

CONCLUSION

Conclusion: Implant stability is affected by bone density. Operator experience has limited effect on IT, tapered slim-apex design has higher stability in D3 bone, and condensing design has higher stability in D5 bone.

18 | Maria Lekomtseva

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent; Rafael Delgado-Ruiz, DDS, MSc, PhD
Department of Periodontics and Endodontics; Department of Prosthodontics and Digital Technology

Implant Surface Resistivity Affected by Oral Hygiene Procedures In-vitro

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OBJECTIVES

Evaluate effects of common oral hygiene procedures on electrical properties of titanium surfaces.

METHODS

Titanium disks (n=20 per group) representing dental implant surfaces were subjected to four oral hygiene procedures: untreated titanium (control), manual toothbrushing for 20 seconds, toothbrushing with toothpaste for 20 seconds, and application of chlorhexidine delivered via syringe and allowed to dry on the titanium surface. Electrical properties, such as resistivity, conductivity and sheet resistance were measured using the Ossila Four-Point Probe System. Statistical analysis was performed via one-way ANOVA with post hoc testing and paired T-test ($p < 0.05$).

RESULTS

Chlorhexidine treated titanium demonstrated significantly smaller values for conductivity ($p < 0.001$) and higher mean sheet resistance and resistivity when compared with pure titanium, toothbrush and toothbrush and toothpaste groups ($p < 0.001$). No significant differences were found for toothbrush and toothbrush with toothpaste groups.

CONCLUSION

Chlorhexidine-treated titanium disks demonstrated the highest electrical resistivity and sheet resistance and the lowest conductivity among oral hygiene procedures evaluated. Further studies are needed to determine whether there is correlation between increased resistance and reduced conductivity and its association with enhanced thermal stability, limited galvanic current flow in the oral cavity, decreased corrosion and peri-implant inflammatory responses.

19 | Soffi Miller

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Irrigation Effects on Zirconia Implant Surface Wettability

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OBJECTIVES

This study evaluated the effect of four commonly used irrigation solutions on the wettability of three commercially available zirconia implant surfaces. Wettability is a critical surface property in implantology, as hydrophilic surfaces promote protein adsorption, cell attachment and osseointegration. While implant surface chemistry has been studied, little is known about how different irrigation solutions interact with specific implant surfaces during clinical site preparation.

METHODS

Zirconia disks (SDS, Zeramex and Cerid) from each system (n = 20) were exposed to the three irrigation fluids (sterile water, saline and distilled water). Sessile drop contact angle measurements were obtained using a goniometer (Ossila®). One-way ANOVA and post hoc testing ($p < 0.05$) were performed to compare wettability differences within and between surfaces and irrigation types.

RESULTS

Wettability varied by both surface and irrigation type. On SDS zirconia, NaCl (72.98°) produced significantly greater hydrophilicity than sterile or distilled water ($p < 0.05$). Zeramex exhibited the poorest wettability overall, with distilled water producing the highest contact angle (94.12°), significantly worse than NaCl ($p = 0.002$). On Cerid zirconia, distilled water yielded the lowest angle (79.52°) and significantly improved wettability compared to NaCl ($p = 0.045$). SDS responded best to NaCl, Cerid to distilled water, while Zeramex consistently showed lower wettability.

CONCLUSION

Irrigation fluid type significantly influences zirconia hydrophilicity, with optimal performance varying by implant surface. Selecting irrigation solutions based on implant material may enhance early surface-tissue interactions and support osseointegration.

20 | Colleen O'Connor

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent; Rafael Delgado-Ruiz, DDS, MSc, PhD
Department of Periodontics and Endodontics; Department of Prosthodontics and Digital Technology

Neurotoxicity Associated with Titanium Particles from Dental Implants: Systematic Review

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OBJECTIVES

The aim of this study was to identify studies that report neurotoxicity induced by titanium dental implants.

METHODS

A systematic review of the literature was completed to identify clinical and experimental studies that evaluate neurotoxicity effects derived from titanium particles from dental implants. This systematic review was registered under PROSPERO (CRD420251156352). The following search engines were used Google Scholar, PubMed, Medline and SCOPUS. The following search terms were used, "dental implants" AND "neurotoxicity" AND "titanium particles"; "dental implants" AND "neurotoxicity"; "titanium implants" AND "neurotoxicity". Studies published between 2015 to 2025 were considered for inclusion. The PRISMA workflow was used to reflect the screening and selection process. Meta-analysis of quantitative data was included.

RESULTS

The initial search returned the following results: 938 (Google Scholar), 1,170 (PubMed), 8 (MEDLINE) and 259 (SCOPUS). After a comprehensive review of the literature and following the inclusion/exclusion criteria in our study, we identified a total of 31 articles. Our preliminary research showed that elevated levels of neuroinflammatory markers, such as soluble fractalkine and IL-1 beta, were observed in patients with long-term titanium implants, suggesting a potential link between titanium exposure and neuroinflammation. Studies on TiO2 nanoparticles in human neuroblastoma cells (SH-SY5Y) demonstrated a significant increase in ROS generation (up to 10-fold, $p < 0.001$) and apoptosis (4-10 times increase), indicating neurotoxic effects. Prenatal exposure to nano-TiO2 in mice resulted in titanium accumulation in the hippocampus ($p < 0.001$) and suppression of neuronal outgrowth proteins, which may impact cognitive function. Additionally, titanium implants in rats induced neuroinflammation, blood–brain barrier disruption and cognitive impairment, indicating long-term neurotoxicity.

CONCLUSION

Several in-vitro and animal studies have shown an association between titanium particles and neurotoxicity. In vivo data are limited, highlighting the need for further research to inform safer implant materials and designs that reduce material wear.

21 | Tawhida Oishi

YEAR 3 DENTAL STUDENT
Advisor(s): Patricia H. Swanson, DDS
Department of Prosthodontics and Digital Technology

Dental Explorer Blunting: Implications for Detection of Open Margins

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OBJECTIVES

This literature review aims to evaluate how tip diameter variations of new and clinically used dental explorers affect accuracy of detecting open margins on dental restorations.

METHODS

A search was conducted on Google Scholar for ""Dental Explorer" AND detection AND sharpness AND margin" which yielded 782 results. Seven results met inclusion criteria. Rappold et al. (1992), Baldissara et al. (1998) and Hayashi et al. (2005) evaluated simulated open margins using explorers of varying sharpness. Pape & Mäkinen (1994) examined explorers under 20x magnification over three years. Leknius et al. (2010) evaluated operator judgement of clinical acceptability of crowns with controlled marginal gaps. Al-Shehri (2017) and Valeri et al. (2024) compared working tips of new and used explorers from clinical practice.

RESULTS

Clinical use-related explorer tip blunting can exceed tactile detection thresholds and compromise clinical assessments if not standardized. Al-Shehri reported a significant difference between tip diameters of new and used explorers. Baldissara et al. reported that a 36µm defect could be detected reliably by 95% of subjects using a sharp explorer. Pape et al. found that ~10% of explorers required sharpening and ~1% needed to be discarded due to dullness. Rappold et al. and Hayashi et al. found that blunted tips increased difficulty for examiners to identify simulated openings. Leknius et al. reported a correlation between examiner experience and marginal gap threshold at which crown margins were deemed unacceptable, indicating calibration is necessary when future research is conducted.

CONCLUSION

Clinical use-related explorer blunting and increased tip diameter can compromise the accuracy of detecting open margins on dental restorations. Further research is needed to establish a standardized "clinically acceptable" diameter threshold for explorer tips which can guide decisions on when explorers should be retired or reconditioned, ensuring optimal performance and reducing risk of undetected open margins.

22 | Danielle Rallis

YEAR 4 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Elemental Analysis of Ocular Tissues in Patients with and without Dental Implants

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OBJECTIVES

Metals play essential roles in biological processes including structural functions, signaling and gene regulation. Abnormal levels of metals can adversely affect cellular functions. Here we determine if X-ray fluorescence spectroscopy (XRFS) can measure levels of various elements in ocular tissues collected during routine ocular surgery. The study evaluated whether levels of metal differed in patients with and without dental implant.

METHODS

This pilot study was approved by the Stony Brook IRB; all patients signed consent. Several differing tissue samples were collected from patients undergoing routine eye surgery. Smoking status, dental/metal implant history and glaucoma (Glc) status were recorded. Samples were analyzed using high resolution energy-dispersive XRFS (NEX DE, Rigaku). Semi-quantitative fundamental parameter analysis was done. Statistical analysis was completed between groups using Mann-Whitney U tests.

RESULTS

43 patients were enrolled (mean 71.4±10.8 years, 57% female, 57% nonsmokers, 57% glaucoma). Detectable elements included Fe, Ni, Cu, Zn and Ca. Elements below the detection limit included Ti, Pb, Cd and Co. In the anterior capsule, the average concentrations in glaucoma vs non-glaucoma patients were: 25.56 vs 21.85 ppm Fe; 11.23 vs 9.26 ppm Ni; 0.84 vs 0 ppm Cu; 1.68 vs 2.7 ppm Zn. In blood, the concentrations in glaucoma vs non-glaucoma patients were: 103.56 vs 31.58 ppm Fe; 8.75 vs 4.89 ppm Ca; 10.33 vs 17.58 ppm Ni; 3.66 vs 4.2 Cu; 5.28 vs 6.38 ppm Zn. No statistically significant differences in levels were seen between Glc and non-Glc or between smokers and non-smokers for any elements.

CONCLUSION

This pilot study showed that XRFS can detect biologically important elements. Although no significant differences between groups were seen, the small number of samples studied precludes any conclusions. XRFS is a useful tool to study ocular tissue and can help researchers investigate potential metal accumulation patterns in ocular diseases.

23 | Amanda Rappa

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Multifactorial Causes of External Apical Root Resorption: A Comprehensive Systematic Review

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OBJECTIVES

Root resorption is a complex multifactorial clinical challenge identified across multiple dental specialties, yet the etiology and mechanism of action remains unclear. It is a multifactorial condition and encompasses both external and internal types, which in itself have many subgroups and differing degrees of severity. Suggested etiologies include periapical inflammation, acute trauma, tumours and cysts, chronic trauma, impaction, idiopathic elements, luxation types of traumatic injury, periradicular periodontitis and orthodontic treatment. This paper reviews the literature and will focus on external root resorption in orthodontics, endodontics, oral surgery and periodontics with the aim of better understanding of how it occurs to apply strategies for prevention.

METHODS

The following bibliographic databases were searched:

- PubMed
- National Library of Medicine
- *International Journal of Oral Science*

A combination of the following key words or phrases was searched in databases:

- External apical root resorption
- Root resorption endodontics
- Ortho external apical root resorption
- Endo external apical root resorption
- Avulsed teeth external apical root resorption
- Calcium-silicate-based cement properties
- External apical root resorption in re-implanted teeth

Inclusion criteria: External apical root resorption

Exclusion criteria: Articles on internal apical root resorption were not included, as the aim was to focus solely on external apical root resorption.

RESULTS

Types of External Apical Root Resorption Discussed

Field of Dentistry	Possible Etiologies/ Contributing factors
Orthodontics:	Type/ Amount of forced applied, Appliances used, Genetic Predisposition
Endodontics:	Necrotic pulp, periapical periodontitis
Oral Surgery:	Re-implantation technique in avulsed teeth, Luxation injuries
Periodontics:	Scaling and root planing technique

CONCLUSION

A thorough understanding of the factors contributing to external apical root resorption is essential, as the condition is irreversible regardless of etiology. Although its exact cause remains unknown, examining the underlying mechanisms provides insight into its development and informs potential preventive strategies. This paper explores the properties of calcium silicate–based cements and their potential role in arresting root resorption.

24 | Sherrina Rose

YEAR 3 DENTAL STUDENT
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General Anesthesia for Dental Rehabilitation in a Pediatric Patient with Sickle Cell Disease: A Case Report

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OBJECTIVES

To describe the perioperative anesthetic management of a pediatric patient with sickle cell disease undergoing comprehensive dental rehabilitation under general anesthesia.

METHODS

A six-year-old male with a known diagnosis of sickle cell disease presented for full-mouth dental rehabilitation under general anesthesia due to extensive dental disease and inability to tolerate treatment. Preoperative assessment focused on identifying disease-specific perioperative risks, including hypoxia, hypothermia, dehydration and physiologic stress. An anesthetic plan was developed to mitigate these risks through careful perioperative monitoring and management.

RESULTS

General anesthesia was induced and maintained with emphasis on maintaining adequate oxygenation, normothermia, analgesia and hydration throughout the perioperative period. Dental treatment was completed without intraoperative complications. The patient emerged from anesthesia in stable condition and experienced an uneventful postoperative course, with no evidence of complications or vaso-occlusive crises.

CONCLUSION

This case demonstrates that pediatric dental rehabilitation under general anesthesia can be safely performed in patients with sickle cell disease through meticulous perioperative planning and disease-specific anesthetic management. Attention to oxygenation, temperature regulation, hydration and physiologic stability is critical to minimizing perioperative complications in this medically complex population.

25 | Luke Tzagournis

YEAR 3 DENTAL STUDENT
Advisor(s): Rekha Reddy, DMD
Department of Oral and Maxillofacial Surgery

Successful Treatment of Proliferative Verrucous Leukoplakia with Topical Imiquimod

Tzagournis, Luke J.; Reddy, Rekha[1]
[1] Department of Oral and Maxillofacial Surgery

OBJECTIVES

Proliferative verrucous leukoplakia (PVL) is an aggressive, precancerous oral lesion characterized by high rates of malignant transformation and recurrence. It typically affects middle-aged females and progresses from flat, white patches to thick, verrucous growths. Standard treatment includes surgical excision or laser ablation, but complete removal can be difficult in cases involving extensive or anatomically challenging locations. Imiquimod is an immune response modifier approved for several epithelial neoplasms. Herein, we present a case of PVL in a 41-year-old female that was successfully managed with topical imiquimod.

METHODS

A custom tray was fabricated to localize topical imiquimod application. The patient applied a thin layer of imiquimod into the tray and wore it for one hour each evening five days per week over six weeks. She maintained a written diary documenting treatment duration and any pain or side effects.

RESULTS

The patient experienced severe intraoral pain, dysgeusia and erythema with ulceration by the fifth week of treatment. Oral discomfort was managed with 2% viscous lidocaine, acetaminophen, or ibuprofen as needed, with oxycodone-acetaminophen prescribed for severe pain. She was also prescribed a course of clotrimazole oral troches for a suspected candida infection. One month after completing treatment, resolution of PVL was noted and the patient denied intraoral pain. However, she reported hypogeusia and persistent dysgeusia. At her six month follow-up, PVL recurrence was not detected.

CONCLUSION

This case highlights the potential use of topical imiquimod as an alternative treatment for PVL. Given its targeted delivery, ease of application and emerging evidence of efficacy with lower recurrence rates, imiquimod holds promise as a future standard of care. Larger prospective studies are warranted to further validate the role of imiquimod and establish its place within the therapeutic armamentarium, particularly for cases where surgery is not feasible or results in significant morbidity.

26 | Anaya Zaineb

YEAR 3 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Wettability of Titanium Implants Utilizing Hyaluronic Acid and Bone Grafts

Zaineb, Anaya; Shah, Rahul; Anderson, Nina K.[1]; Romanos, Georgios E.[2]
[1] Department of Oral Biology and Pathology
[2] Department of Periodontics and Endodontics

OBJECTIVES

This in vitro study investigates the wettability of titanium implants under the influence of hyaluronic acid (HA) with bone grafting materials.

METHODS

Two groups of titanium implant surfaces in the form of disks: titanium alloy (Ti-alloy) and titanium with sand-blasted, acid-etched surface (Ti-SLA) were treated with six different solutions: HA (Gengigel®) (Group 1), 0.9% sodium chloride (NaCl) (Group 2), as well as the residues after mixing bovine grafting material (W-Bone™) with HA (Group 3), W-Bone™ mixed with NaCl (Group 4), algae-based bone graft (AlgOss™) mixed with HA (Group 5) and AlgOss™ mixed with NaCl (Group 6). A pipette was used to dispense 10 µL of the supernatant onto the center of each implant surface disk (Ti-alloy, Ti-SLA) with 20 trials per surface (n=240). Wettability was assessed by measuring two wetting angles using a goniometer. To determine differences, One way ANOVA with posthoc multiple comparisons was performed.

RESULTS

In group 1, the contact angles were: Ti-alloy 35.7°±3.29, SLA 43.3°± 9.78, in group 2, Ti-alloy 91.7°±3.45, SLA 90.0°±7.09; in group 3, Ti-alloy 33.9°±4.15, SLA 42.4°±8.39; in group 4, Ti-alloy 60.4°±18.56, SLA 85.8°±10.17; group 5, Ti-alloy 42.6°±8.53, SLA 49.5°±10.07 and in group 6, Ti-alloy 84.9°±5.28, SLA 85.5°±13.93. The Bonferroni posthoc comparisons revealed significant differences between the groups when HA was used (p's<=0.001).

CONCLUSION

Within the limitations of this study, the application of HA on titanium implants can have favorable therapeutic outcomes by increasing the wettability of titanium surfaces when mixed with grafting materials.

27 | Ahmed Abdullah

YEAR 4 DENTAL STUDENT
Advisor(s): Nora Odingo, BDS, DMD, MPH
Department of Oral and Maxillofacial Surgery

Soft Tissue Nodule of Gingiva: A Case Report and Review of Differential Diagnosis

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OBJECTIVES

To present a case report of a gingival mass and discuss differential diagnosis and clinical considerations for soft tissue nodules of the gingiva.

METHODS

A 53-year-old female presented with a painless, firm nodule of the left mandibular alveolar mucosa, which had been enlarging slowly for two years. The mucosal-colored nodule was on the buccal gingiva/vestibular interface posterior to non-vital tooth #20. Slight cupping resorption of the alveolus was noted on intra-oral radiography in the area of the lesion. The clinical diagnosis was peripheral giant cell granuloma. Extraction of tooth #20 and concurrent excisional biopsy of the nodule were performed, with careful dissection of the lesion due to its proximity to the mental nerve.

RESULTS

Initial histopathologic diagnosis for the nodule was "squamous mucosa with subepithelial acute and chronic inflammation and a prominent vascular network; no multinucleated giant cells were identified; benign vascular tumor including pyogenic granuloma cannot be ruled out." The histopathology was further characterized on second opinion as being consistent with a pyogenic granuloma.

CONCLUSION

This case highlights the importance of integrating clinical findings, surgical considerations and histopathologic interpretation in the diagnosis of mandibular soft tissue lesions. Histopathologic evaluation by a sub-specialist may be necessary to achieve a definitive diagnosis, particularly when clinical features overlap among reactive and neoplastic entities.

28 | Lauren Brown

YEAR 4 DENTAL STUDENT
Advisor(s): Lorraine Danowski, PhD, RD; Dolores Cannella, MA, PhD
Department of Family, Population and Preventive Medicine; Department of General Dentistry

Navigating CODA Standards on Nutrition Counseling: Interactive Ideas to Implement

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[1] Department of Family, Population and Preventive Medicine
[2] Department of General Dentistry

OBJECTIVES

The oral cavity reflects systemic health and is connected to many chronic conditions. Diet and nutrition are undeniable links to disease development, and this relationship must be understood to foster competence in dental students. A new CODA standard proposes not only in-depth didactic instruction for nutrition, but also direct patient care assessments for nutritional counseling. A method is presented that utilizes role-play, translates to clinical experience, and provides student feedback.

METHODS

Nutrition is a required course in the SDM dental curriculum, covering topics including diabetes and disordered eating. To help students demonstrate competency in nutritional counseling, case-based role-playing was implemented. Reflective assignments were completed, as well as post-case activities to assess their level of confidence. Prompts asked how comfortable students felt initiating nutritional discussions with patients and what tools they'd need to improve counseling methods. Surveys inquired how students would advise patients and what oral healthcare regimen they would recommend based on nutritional status.

RESULTS

Eighty-eight reflections were submitted with suggestions to link more objective dental information such as intraoral photos, oral pH and blood sugars/HBA1c values, as well as educational resources for more in-depth nutritional counseling. Comments also emphasized practicing nonjudgmental language, the need for strategies for handling reluctant patients, and consideration of parental involvement for children and adolescents. Additionally, the voluntary post-case surveys (n=91) indicated that role-play increased confidence in advising patients in both oral and nutritional health, as well as demonstrating competence when asking questions regarding disease and dental correlates.

CONCLUSION

Role-play and case-based learning support meeting accreditation standards, as well as improving courses in general. Students reported increased confidence in initiating nutritional conversations and viewed themselves as integral to interdisciplinary care.

Continued refinement of scenarios based on student feedback can further strengthen clinical competence and improve patient outcomes in nutritional counseling.

29 | Angela Chou

YEAR 4 DENTAL STUDENT
Advisor(s): Georgios Romanos, DDS, PhD, Prof Dr med dent
Department of Periodontics and Endodontics

Morphologic Analysis of Metal Particle Release Following TAD Insertion

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[2] Department of Materials Science and Chemical Engineering
[3] Department of Oral Biology and Pathology
[4] Department of Periodontics and Endodontics

OBJECTIVES

Temporary anchorage devices (TADs) are widely used in orthodontics to provide skeletal anchorage and are composed of biocompatible metal alloys. However, friction and mechanical stress during insertion may result in metal particle release. This study aimed to quantify and characterize metal particle release during in vitro TAD insertion to assess potential biological and allergic implications.

METHODS

Dentaurum® TADs (n = 20; 10 mm length, 1.6 mm diameter) were hand-torqued into artificial bone blocks (Sawbones) simulating cancellous bone (3 mm thickness, 30 lb/ft^3 density). Bone block surfaces were analyzed before and after insertion, with primary stability confirmed. Synchrotron radiation X-ray fluorescence (XRF) spectroscopy was used to quantify metal composition at the coronal, middle and apical thirds of the osteotomy sites (n = 120). Statistical analysis was performed using ANOVA ($p < 0.05$). Additional TADs from Dentaurum and American Orthodontics (n = 2 each) were inserted into identical bone blocks to further assess metal release. Scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS) were used to evaluate particle morphology and elemental composition.

RESULTS

Nickel concentrations were highest in the coronal third (14,255 ± 11,818.4 ppm), while aluminum predominated in the middle and apical thirds (14,985 ± 6,407.3 ppm and 13,740 ± 6,424.1 ppm, respectively). Most differences were statistically significant ($p < 0.05$). Particle sizes ranged from 3.5 to 18 µm, consistent with metallic particulate matter. EDS confirmed elemental peaks primarily corresponding to titanium and iron.

CONCLUSION

These findings suggest that mechanical insertion of TADs in vitro can induce metal release with possible implications for local tissue response and hypersensitivity risk. Given the potential for biological reactivity, further in vivo studies are warranted to assess the clinical relevance of metal particle release.

30 | Courtney Hakimian

YEAR 4 DENTAL STUDENT
Advisor(s): Georgios E. Romanos, DDS, PhD, Prof Dr med dent; Stefan Judex, PhD
Department of Periodontics and Endodontics; Department of Biomedical Engineering

The Role of Vibration in Orthodontic Movement and Bone Metabolism: A Review

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[1] Department of Periodontics and Endodontics
[2] Department of Biomedical Engineering

OBJECTIVES

Accelerating orthodontic tooth movement while maintaining periodontal and bone health is highly desirable to reduce treatment duration and associated risks, including caries, root resorption and periodontal disease. This review aimed to evaluate the role of vibration in bone metabolism and orthodontic tooth movement across in vitro, in vivo and human clinical studies.

METHODS

A comprehensive literature review of 54 articles published between 1959 and 2025 was conducted. Studies evaluating vibration in relation to bone formation, bone remodeling, orthodontic tooth movement and pain modulation were included. Evidence from cell culture models, animal studies and human clinical trials was analyzed.

RESULTS

Low-intensity vibration applied to osteocytes in vitro was associated with reduced RANKL expression and decreased osteoclast formation. Animal studies demonstrated increased bone formation, higher bone density and accelerated orthodontic tooth movement, particularly in rat models. Human studies of whole-body vibration showed increased bone mineral density and improved muscle function. Intraoral vibration devices were also associated with reduced pain perception following orthodontic and surgical procedures.

CONCLUSION

Low-intensity vibration demonstrates promising biological effects on bone metabolism and orthodontic tooth movement, with additional benefits in pain reduction. While preclinical and early clinical data are encouraging, further well-controlled human clinical studies are needed to establish optimal protocols and confirm clinical efficacy.

31 | Eve Pomazi

YEAR 4 DENTAL STUDENT
Advisor(s): Patricia H. Swanson, DDS
Department of Periodontics and Endodontics

Tooth Bound Edentulous Site Restorations at the SBUDCC

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[1] Department of Oral Biology and Pathology

OBJECTIVES

Missing teeth negatively affect oral function, esthetics and overall quality of life. Tooth supported fixed dental prostheses (FDPs), resin bonded FDPs, and implant supported crowns represent common restorative options for tooth-bound edentulous spaces, each with distinct benefits. This study aimed to evaluate restorative treatment trends for single-tooth edentulous sites at the Stony Brook University Dental Care Center (SBUDCC) from 2015-2025. Specifically, it sought to determine the frequency and distribution of implant-supported crowns, tooth supported FDPs, and resin bonded FDPs provided in the student clinic to better understand clinical decision-making patterns in an academic setting.

METHODS

A Tableau-generated search of AxiUm records from 2015–2025 was conducted using CDT codes categorized into four groups: screw retained implant crowns, cement retained implant crowns, resin bonded FDPs and tooth supported FDPs. Extracted data included patient age, sex and tooth site. Descriptive analyses were visualized using radar charts and bar graphs to illustrate the prevalence and distribution of restorative modalities across demographic groups and tooth locations.

RESULTS

The search yielded 2,290 relevant charts, with a near-equal gender distribution. Screw retained implant crowns were the most common restoration, most frequently placed in maxillary premolar regions, with porcelain/ceramic as the predominant restorative material utilized. Resin bonded FDPs were most commonly placed at lateral incisor sites, especially in the mandibular anterior region. Tooth supported FDPs were less common than implant crowns. Across age groups, mandibular first molars were the most frequently replaced tooth.

CONCLUSION

Implant supported restorations were the predominant treatment for single tooth replacement at the SBUDCC over the 10-year period in the study. Future investigations should explore factors influencing treatment selection, including insurance type, systemic conditions and the condition of adjacent teeth, while considering potential coding inconsistencies as a study limitation.

32 | Brett Allen, DDS

RESIDENT
Advisor(s): Tanya Somohano, DDS; Rafael Delgado-Ruiz, DDS, PhD, MSc
Department of Prosthodontics and Digital Technology

Effect of Surface Treatments on Bonding Strength to CAD/CAM Acetal Resin: An In-vitro Study

Allen, Brett; Somohano, Tanya[1]; Delgado-Ruiz, Rafael[1]
[1] Department of Prosthodontics and Digital Technology

OBJECTIVES

The aim of this in vitro study was to evaluate the effect of four different surface treatments on the shear bond strength of CAD/CAM milled acetal resin to a reline material, and to compare the results with polymethylmethacrylate (PMMA).

METHODS

A rectangular block was designed. 80 blocks were milled in Acetal Resin (n=40) and Polymethyl Methacrylate (n=40). Four experimental groups were created based on the applied surface treatment for Acetal Resin and PMMA: no surface treatment (n=10 pmma, n=10 acetal), airborne particle abrasion (n=10 pmma, n=10 acetal), monomer application for PMMA (n=10) and Universal Bond application for Acetal Resin (manufactures recommendation) (n=10) and airborne particle abrasion plus monomer for PMMA (n=10) and Universal Bond for Acetal Resin (n=10). A standardized bonding procedure was applied and a bisacryl reline material was applied for acetal samples, and PMMA reline material was used for PMMA samples. Shear bond strength testing using an Instron universal testing machine at a crosshead speed of 1 mm/min until failure was applied.

RESULTS

One way ANOVA results demonstrated no significant differences among PMMA surface treatments (p=.471) and significant differences among the Acetal Resin (p=< 0.001) groups. CAD/CAM-milled acetal resin bonded to bisacryl exhibits negligible bond strength without surface treatments whereas PMMA demonstrates clinically acceptable shear strength across all treatments.

CONCLUSION

Preliminary results indicate the reline of milled acetal resin provisionals with bisacryl has low shear bond strength and additional methods, such as mechanical retention, are indicated.

33 | Anthony Allison, DDS

RESIDENT
Advisor(s): Richard Faber, DDS, MS
Department of Orthodontics and Pediatric Dentistry

The Slot Height and Dimensional Accuracy of 3D-Printed Zr-Based Brackets

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[1] Department of Prosthodontics and Digital Technology
[2] Department of Orthodontics and Pediatric Dentistry

OBJECTIVES

The primary objective of this study was to evaluate the slot height, slot depth, base height and torque accuracy of orthodontic brackets printed using a zirconia nanohybrid photopolymer resin (Rodin Sculpture 2.0) within a Digital Light Processing (DLP) workflow. This work provides quantitative validation of both the linear and angular fabrication precision achievable with ceramic-filled photopolymers in fully digital orthodontic workflows.

METHODS

Fifty standard AO edgewise brackets were fabricated using DLP, following CAD designs informed by Finite Element Analysis (FEA) to ensure adequate mechanical strength. Dimensional accuracy and slot geometry were measured using a Keyence VHX-7000 optical microscope and compared with nominal CAD specifications using ImageJ and Geomagic Control X. Torque accuracy was evaluated by high-magnification optical sectioning of the slot walls and direct angular measurement relative to the bracket base, with a clinical tolerance of ±0.35° applied for pass/fail classification.

RESULTS

The printed brackets demonstrated high dimensional fidelity, with mean deviations under 1% for Slot Height, Slot Depth and Base Height, and more than 92% of samples falling within the ±0.05 mm clinical tolerance. Torque measurements revealed a mean value of 7.02° relative to the nominal 7.00° prescription, with a standard deviation of ±0.19°. A total of 48 out of 50 brackets met the ±0.35° tolerance threshold, yielding an overall torque accuracy of 96.0%. Slot Depth showed the greatest variability (SD 0.019 mm). This pattern is consistent with known optical attenuation and over-curing effects that occur in deeper geometries during DLP processing.

CONCLUSION

Despite localized variability in Slot Depth, all linear and angular measurements remained within clinically acceptable limits for torque expression and archwire engagement. Torque accuracy met and exceeded the predefined 95% statistical requirement, confirming that DLP-printed zirconia brackets can reliably reproduce both dimensional and angular prescription values. These findings indicate that brackets printed from this zirconia resin through a calibrated DLP workflow can achieve the precision required for integration into modern fully digital orthodontic workflows.

34 | Simone DeBellis, DDS

RESIDENT
Advisor(s): Alexandra Makara, DDS
Department of Orthodontics and Pediatric Dentistry

Emergent Needs Prior to General Anesthesia: Variations for SHCN

Simone DeBellis[1], Karolina Grodzki, Nina Anderson[2], Alexandra Makara[1]
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[2] Department of Oral Biology and Pathology

OBJECTIVES

Pediatric patients may require full mouth dental rehabilitation (FMDR) under General Anesthesia (GA) due to severity and extent of disease, complex medical history, behavior, or pre-cooperative age. Children with special health care needs (SHCN) present unique challenges in an outpatient setting. During extensive wait times, patients may experience acute odontogenic pain or infection that requires emergency intervention prior to receiving care under GA. There is a paucity of data on the impact of extensive GA wait times for patients with SHCN. The aim of this study is to evaluate differences in emergency treatment for patients pending FMDR under GA with SHCN and without SHCN.

METHODS

This is a retrospective chart review of the AxiUmTM Record at SBDCC for patients 7 years and 3 months or younger on the GA waitlist. The outcome variable is emergency treatment, defined as any extraction completed in the clinic or emergency department (ED). Data collected includes date added to the waitlist, date FMDR treatment was rendered, age at time of FMDR, length of time the patient on the waitlist, dates of emergency extractions in the clinic or ED, length of time between date added to waitlist and emergency treatment. Statistical analyses include t-test, chi square, and ANOVA analyses.

RESULTS

Of patients awaiting full mouth dental rehabilitation under general anesthesia, 14.3% required emergency treatment for acute dental infection, with no significant difference in emergency rates for patients with SHCN compared to those without. Of significance, patients with special health care needs were older at time of treatment.

CONCLUSION

Prolonged wait times were associated with a substantial risk of emergency dental complications. These findings underscore the importance of reducing wait times and improving timely access to treatment, particularly for vulnerable populations.

35 | Brandon Fitzgerald, DMD

RESIDENT
Advisor(s): Dan Colosi, DDS, PhD
Department of Prosthodontics and Digital Technology

CT Airway Volume and Area Derived from Readily-Available Viewer Software – Can They Help Predict Difficult Laryngoscopy and Intubation in Surgical Patients?

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[2] Department of Oral Biology and Pathology

OBJECTIVES

This retrospective study aims to develop a method for anesthesiologists to quickly evaluate airway volumes for patients with a pre-existing CT study of the cervical spine. We are assessing if the Thresholding tool in 3D Slicer viewer software can provide statistically significant airway volumes and minimum cross-sectional areas for pre-operative evaluation. If we can show that there is an easy-to-use tool that can help anticipate a difficult airway by predicting a difficult grade of laryngoscopy, this could make anesthesia even safer than it already is, and prevent the dreaded "cannot ventilate, cannot intubate" scenario. If these CT studies are available can potentially increase patient safety, why are we not using them to maximize outcomes?

METHODS

CT studies of the airway/cervical spine, acquired within 3 months before patients underwent a surgical procedure including laryngoscopy and intubation at Stony Brook Hospital, were extracted from the patient's Electronic Medical Record. Data were de-identified and anonymized. The Thresholding tool in 3D Slicer was used to obtain airway volume (cm3) and minimum cross-sectional area (mm3). Records were reviewed within the date range of December 1, 2015, to September 5, 2025. The following values were recorded from the anesthesia record:

- Cormack/Lehane Grade
- Video/Regular Laryngoscope and Type
- Video/Regular Laryngoscope Size
- Route: Oral/Nasal

Data were then analyzed for correlation with type and grade of laryngoscopy, airway volume and minimum cross-sectional area.

RESULTS

Data collection is currently underway and has shown excellent reproducibility and ease of measurement.

CONCLUSION

The ease of use and reproducibility of this method shows potential for its use in clinical practice. Once data processing is completed, statistical significance will be evaluated and presented in the poster.

36 | Ryan Grove, DDS

RESIDENT
Advisor(s): Dan Colosi, DDS, PhD
Department of Prosthodontics and Digital Technology

Optimization of MRI Acquisition Parameters and Implant Orientation to Reduce Titanium Dental Implant Artifacts

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[2] Department of Radiology, Division of Medical Physics

OBJECTIVES

Magnetic resonance imaging (MRI) provides high-resolution images using tissue specific differences in hydrogen content to generate contrast and has growing applications in dental implant planning and pathology assessment. However, titanium implants produce magnetic susceptibility artifacts that obscure adjacent anatomy and limit diagnostic reliability. Although prior studies have explored artifact reduction with different sequences, dental-specific data remain limited, and implant orientation relative to the main magnetic field (B_0) has largely remained uninvestigated. Orthopedic literature suggests artifacts decrease when metallic objects are aligned parallel to B_0, but this has not been systematically evaluated for dental implants. This study aims to determine how implant angulation and MRI acquisition parameters such as spin echo (SE) and gradient echo (GRE) influence artifact magnitude.

METHODS

A single-implant phantom was constructed using a diamagnetic polycarbonate container containing a titanium implant embedded in 2% agar doped with 0.5 mM $CuSO_4$ to simulate soft-tissue relaxation properties. Imaging was performed on a 1.5T GE Signa system using SE T1- and T2-weighted and GRE sequences with varying echo times and bandwidths.

RESULTS

Preliminary testing completed with a single titanium implant in the previously described phantom solution demonstrated uniform background signal, adequate signal-to-noise ratio, and successful acquisition of all sequences. Parameter adjustments produced measurable changes in artifact size and morphology.

CONCLUSION

This reproducible phantom model enables systematic evaluation of MRI sequence optimization to reduce susceptibility artifacts and improve diagnostic performance in dental imaging. Preliminary data demonstrate reliable signal generation, clear visualization of titanium-induced artifacts, and the ability to modulate artifact appearance through sequence adjustments. Next, we will analyze the effect of implant orientation with respect to B_0 and different MRI sequence parameters such as TE and bandwidth on artifacts using a 3D printed rotatable platform.

37 | Aria Hourizadeh, DDS

RESIDENT
Advisor(s): Srinivas Myneni, BDS, MS, PhD
Department of Periodontics and Endodontics

Desquamative Gingivitis: A Case Report

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OBJECTIVES

To describe the identification, diagnostic workup and histopathologic confirmation of reticular oral lichen planus during routine periodontal evaluation, and to emphasize the importance of comprehensive soft tissue examination and biopsy for early detection and appropriate long-term surveillance.

METHODS

A 74-year-old female with a medical history significant for hyperlipidemia, mild asthma, hypertension and type 2 diabetes mellitus presented to the Stony Brook University Postgraduate Periodontics clinic for comprehensive periodontal assessment. Her medications included atorvastatin, albuterol, amlodipine and valsartan. Extraoral examination was unremarkable. Intraoral examination revealed bilateral, diffuse, white lacy striations affecting the buccal mucosa and buccal gingiva, consistent with a reticular pattern. The patient denied pain, burning, or irritation. To establish a definitive diagnosis, a 4 × 4 mm incisional biopsy was obtained from the right buccal mucosa and submitted for hematoxylin and eosin staining and direct immunofluorescence analysis.

RESULTS

Histopathologic evaluation demonstrated features consistent with a lichenoid mucositis. Direct immunofluorescence revealed intense shaggy deposition of fibrinogen along the basement membrane zone, characteristic of lichenoid reactions, including oral lichen planus.

CONCLUSION

This case highlights the importance of thorough soft tissue examination during periodontal evaluation and the role of biopsy with direct immunofluorescence in differentiating lichenoid lesions. Early recognition of asymptomatic OLP facilitates appropriate monitoring, risk assessment and long-term surveillance for potential dysplastic or malignant transformation.

38 | Sahana Kamisetty, DDS; Judy Chen, DDS

RESIDENT
Advisor(s): Thomas Manders, DDS; Miriam Rafailovich, PhD
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In Vivo Evaluation of the Regenerative Potential of an Innovative Injectable and Retrievable Drug Delivery System for Endodontic Therapy Using a Canine Model

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Cymerman, Jerome[1]; Walker, Stephen G.[2]; Sadasivan, Chander[3]; Manders, Thomas[1]; Rafailovich, Miriam[3]
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[2] Department of Oral Biology and Pathology
[3] Department of Materials Science and Chemical Engineering

OBJECTIVES

Endodontic failures are often associated with Enterococcus faecalis infection and subsequent periapical inflammation. Calcium hydroxide, a widely used intracanal medicament, demonstrates limited antimicrobial efficacy against E. faecalis, poor handling and cytotoxicity. To address these limitations, a thermoreversible hydrogel (F127-DMA/CASA), combining calcium hydroxide with salicylic acid, was developed. This study aimed to evaluate its in vivo efficacy in promoting periapical healing and bone regeneration.

METHODS

18 single-rooted permanent teeth in beagle dogs (10 and 16 months old) were allocated to three groups: F127-DMA/CASA, calcium hydroxide (Vista-Cal) and non-medicated control. After inoculation with E. faecalis, canals were instrumented with the WaveOne reciprocating system, irrigated with 5.5% NaOCl, medicated at week 8, and obturated at week 12. Periapical healing was monitored by CBCT at weeks 2, 4, 6 and 10 post medication, and lesion volume was measured using 3D Slicer. All dogs were adopted after the study.

RESULTS

After week 6 post-medication, results indicated a faster and greater reduction in periapical lesion volume for the F127-DMA/CASA group, versus the control and Vista-Cal groups. This persisted until week 10 post-medication. Average reduction in lesion volume was 53.8% for the CASA group, 37.8% for the Vista-Cal group, and 26.1% for the control group.

CONCLUSION

F127-DMA/CASA hydrogel demonstrated superior antimicrobial and regenerative potential, suggesting promise as an intracanal medicament. With its bone healing ability, the effect on stem cell osteogenic differentiation of the apical papilla in regeneration can further be investigated.

39 | Jinha Kim, DDS

RESIDENT
Advisor(s): Mina Mahdian, DDS, MDSc
Department of Prosthodontics and Digital Technology

Deep Learning–Based Segmentation of Arterial Calcifications in Dental CBCT: Validation with an Expanded Dataset and Analysis of Image Quality and Calcification Size Effects

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OBJECTIVES

To validate and expand a previously reported nn-UNet deep learning model for automated segmentation of extracranial carotid (ECC), intracranial carotid (ICC) and vertebral artery (VAC) calcifications in dental cone beam computed tomography (CBCT), and to evaluate the effects of image quality and calcification size on segmentation accuracy.

METHODS

A retrospective study of 540 CBCT scans (2009–2025, IRB #2023-00036) was performed, expanding the original 148-case dataset by 381 new scans from the same institution. After exclusions, the dataset comprised 279 ECC, 244 ICC and 58 VAC cases. Manual reference segmentations were created in 3D Slicer by calibrated operators and verified by a board-certified oral and maxillofacial radiologist. The previously developed 3D nn-UNet architecture was applied without modification with a dedicated hold-out test set. Segmentation performance was assessed using Dice similarity coefficient (DSC), 95th-percentile Hausdorff distance (HD95), average symmetric surface distance (ASSD) and relative absolute volume difference (RAVD). Additionally, the relationship between segmentation accuracy, image quality (radiologist scores and BRISQUE metric), and calcification size was evaluated using Pearson correlation and linear regression.

RESULTS

The model achieved mean DSC of 0.50 (ECC), 0.60 (ICC) and 0.36 (VAC), representing improvements of 22%, 30% and 9% from the pilot study. Calcification size was significantly correlated with segmentation accuracy ($p < 0.05$) from the original dataset, while neither radiologist-rated image quality nor objective BRISQUE scores showed significant effects on performance.

CONCLUSION

Expanding the dataset with a hold-out validation improved nn-UNet segmentation accuracy for all three arterial calcifications in dental CBCT. Segmentation performance was influenced by calcification size rather than image quality, supporting the model's robustness across varying imaging conditions. These findings strengthen the evidence for AI-assisted vascular calcification detection as a potential chairside tool for cardiovascular risk screening. Future work will incorporate radiomics-based cardiovascular disease prediction using the expanded dataset.

40 | Nicholas Nemeth, DDS

RESIDENT
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Department of Prosthodontics and Digital Technology; Department of Periodontics and Endodontics

Two-Phase Deep Learning Approach for Periodontal Diagnosis

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OBJECTIVES

The objective of this project was to train AI-based models for tooth localization and calculation of % radiographic bone loss. Additionally, the models are being trained to integrate patient characteristics with periodontal charting and radiographs to stage and grade patients based on the 2017 World Workshop Classification of Periodontal Disease.

METHODS

100 patients of the periodontics department at Stony Brook University seen by NN or RS were included. Inclusion criteria was patients with a recent periodontal charting, full mouth radiographs and a completed medical history. Exclusion criteria was full mouth radiographs which the alveolar crest or root apices could not be seen clearly. Percentage of bone loss was manually calculated per tooth per patient by NN or RS. These measurements were compared to those calculated by trained models. Additionally, the models were fed periodontal charting and patient characteristics to compute a periodontal stage and grade.

RESULTS

Our model accurately identified teeth from full-mouth radiographs with the following statistics: mAP@0.5 = 0.87, Precision = 0.90, Recall = 0.85. Furthermore, the model accurately localized CEJ, alveolar crest and apex keypoints with the following Mean Pixel Error of the following landmarks: CEJ: 1.8 px, Crest: 2.1 px and Apex: 1.2 px. AI-calculated bone loss was compared to sites classified as diseased vs non-diseased using full periodontal charting. The Classification performance is as follows: Sensitivity = 84%, Specificity = 81%, AUC ≈ 0.88, MAE = 5.5%. Using AI-derived Radiographic Bone Loss percentage integrated with patient risk factors (age, smoking, HbA1c), the system generated AAP–EFP Stage & Grade classifications. The system generated classifications agreeing with the clinicians' charting data had a staging accuracy of 78% and a grading accuracy of 73%.

CONCLUSION

We built an automated periodontal radiographic analysis pipeline capable of identifying teeth, detecting landmarks, quantifying bone loss, and accurately staging and grading periodontitis patients.

41 | James Sheffield, DDS

RESIDENT
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Correlation Between Hunter–Schreger Band Characteristics and Dental Attrition: A Pilot Study

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OBJECTIVES

The objective of this pilot study was to evaluate the density and orientation of Hunter–Schreger (HS) bands in the incisal third of human anterior teeth and to investigate their potential relationship with the degree of enamel attrition.

METHODS

This experimental study was exempt from Institutional Review Board oversight (Ref. IRB2024-00458). Extracted human anterior teeth were obtained from cadaveric donors and screened for physiological wear without restorations involving the incisal edges. Teeth with fractures, structural defects, or non-physiologic crown destruction were excluded. A total of 142 teeth were included: maxillary central incisors (n=20), maxillary lateral incisors (n=20), canines (n=48) and mandibular incisors (n=54). Attrition was classified using Gustafson's scoring system (Classes 0–3). Specimens were longitudinally sectioned, polished, and analyzed under reflected-light microscopy at 100× magnification. HS band orientation was measured as the angle between the most coronal visible band and a reference line perpendicular to the long axis of the tooth. HS band density was defined as the number of bands within the most incisal 2 mm of enamel. Statistical analysis included one-way ANOVA or independent t-tests where appropriate (α=0.05).

RESULTS

No statistically significant differences were observed between attrition classes for HS band density or orientation within any anatomical group. For canines, no differences were noted in band density (p=0.796) or angle (p=0.093). Similar findings were observed for mandibular incisors (density p=0.171; angle p=0.365) and maxillary lateral incisors (density p=0.163; angle p=0.157). Maxillary central incisors exhibited only Class 0 and Class 1 attrition, with no significant differences between groups.

CONCLUSION

Within the limitations of this pilot study, no correlation was found between HS band density or orientation and the degree of enamel attrition. Further investigations with larger sample sizes and broader wear distributions are warranted.

42 | Asfandyar Sheikh, BDS

RESIDENT
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Validation of Model Predicting Furcation Involvement in Newly Crowned Teeth — A 5-Year Retrospective Follow-Up

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OBJECTIVES

This study aimed to perform a prediction model validation for furcation involvement (FI) risk in molars receiving a new fixed prosthesis (FP) using a unique cohort assessed at three time points.

METHODS

Following the Oral Health Statistical (OHStat) reporting guidelines, this cohort study examined 181 patients (203 molars) from 2018–2023. Teeth without FI were followed longitudinally post-crown placement at 1-year (T1), 3-years (T2) and 5-years (T3). A logistic regression model was built in order to predict FI, and the related performance was assessed through metrics like AUC, sensitivity, specificity and calibration.

RESULTS

FI was observed in 4.43% of teeth at 1 year, increasing to 21.67% at 3 years and 28.57% at 5 years. Univariate analysis revealed significant predictors at 3–5 years: a history of periodontitis was associated with higher FI risk at 5 years (RR = 3.56, p = 0.024), with advanced stages also increasing risk—stage III: RR = 2.59 at 3 years and RR = 3.32 at 5 years; stage IV: RR = 3.76 at 3 years and RR = 3.75 at 5 years. Short root trunks significantly increased FI risk across all intervals (1 year: RR = 3.96; 3 years: RR = 6.08; 5 years: RR = 4.75). Medium trunks did not differ significantly from long trunks. The predictive model performed best at 3 years (AUC = 0.81, sensitivity = 0.79, specificity = 0.87) and remained robust at 5 years (AUC = 0.76, sensitivity = 0.69, specificity = 0.90).

CONCLUSION

The predictive model demonstrated high accuracy with a substantial ability to identify FI cases over time. Clinicians should consider such an assessment before crown or bridge restoration, with particular caution in patients with periodontitis.

43 | Eric Zhang, DDS

RESIDENT
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Investigating the Leaching of Plastic Compounds from Orthodontic Clear Aligners and Retainers

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[3] Department of Atmospheric Sciences

OBJECTIVES

The extensive use of plastics in consumer products has increased awareness about the potential health risks associated with their chemical composition. Zimmerman et al. (2019, 2021) discovered the presence of chemicals in plastics and their leaching of particles. The potential health effects of orthodontic plastic materials have sparked interest among practitioners and patients. This investigation evaluates the leaching of plastic particles from aligners and retainers under realistic oral cavity conditions.

METHODS

This study employed an in vitro design. 3M Clarity and Essix appliances were individually suspended in covered glass dishes and submerged in artificial saliva. These dishes were placed on a shaker at 37°C to simulate oral conditions. Control samples with artificial saliva were analyzed without aligner submersion. Samples were filtered and tested after 14 days of submersion using RAMAN spectroscopy.

RESULTS

Plastic particles were identified in both 3M Clarity aligners or Essix retainers under RAMAN microscopy and spectroscopy with 100x magnification. Spectra were obtained for particles of interest and corresponded to standard spectra taken from aligner appliances. Both sample types showed some detectable levels of plastic leaching under the experimental conditions. The Essix samples leached more microplastics than the 3M samples but there was no difference in the sizes of the particles between groups.

CONCLUSION

Under the tested conditions, 3M Clarity aligners and Essix retainers exhibited leaching of detectable plastic particles. Essix retainers had a greater number of microplastics than the 3M Clarity aligners. In our subsequent phases, research with fluorescent dye-based techniques will provide greater insight into the leaching of smaller particles and quantification of such particles from the aligner appliances.

44 | Fernando Aguilar-Perez

MASTER'S STUDENT
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TiO2 Nanoparticles Interaction with Human Osteoblasts

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OBJECTIVES

While nanoparticle research typically focuses on intracellular impacts, the role of extracellular nanoparticles is equally critical. During high exposure, particles that remain outside the cell can adhere to the cell's surroundings. These accumulations modify the local microenvironment, creating chemical and mechanical changes that ultimately affect cell physiology. This study aims to evaluate the effects of TiO2 nanoparticles on osteoblast differentiation.

METHODS

Human Osteoblasts (PromoCell) were expanded in T75 flasks for six days in Osteoblast Growth media (Lonza). After reaching 80% confluence, they were harvested and counted. Osteoblasts were seeded at 2.5x104 cells per well in 24-well plates and at 1.5x105 cells per well in 6-well plates. The experiment was conducted on two different substrates: tissue culture plastic and thin collagen film. Twenty-four hours after seeding, TiO2 nanoparticles were added to each well at 0.1 and 0.4 mg/mL. The cells were incubated for 28 days at 37°C and 7.0% CO2 and the culture medium was changed regularly. After incubation, Alizarin Red staining was used to evaluate mineral deposits, and RT-qPCR was performed to identify markers of osteogenic differentiation.

RESULTS

Mineralized deposits were observed in all experimental groups, with an observable increase in the groups with collagen when compared with the same TiO2 concentration without collagen. Regarding TiO2, increased mineralization was observed in the 0.4 group compared with the 0.1 and control groups, as evidenced by ARS. Expression of the osteogenic markers ALP, OCN and Col1 was observed in the studied groups, with the 0.1 group on collagen showing the highest expression of all studied markers.

CONCLUSION

Mineralization occurs in both treated and untreated osteoblast controls, with a notable increase when cultured on collagen thin films. Low TiO2 nanoparticle concentrations seem to upregulate the expression of osteogenic markers in mature osteoblasts, especially on collagen.

45 | Rayan Ayub

MASTER'S STUDENT
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Mitigating Failure-to-Fail in Dental Education

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OBJECTIVES

Failure-to-fail (FTF) refers to the reluctance of evaluators to assign failing or lower scores to underperforming students. FTF contributes to grade inflation, underutilization of assessment scales, and limits both program improvement and student growth through constructive feedback. It also creates a false sense of achievement for the student. At the School of Dental Medicine (SDM), the Daily Formative Assessment measures six domains—Communication, Patient Management, Professionalism, Procedure Preparedness, Understanding of Procedure, and Performance of Procedure—on a 4-point scale (1 = exceeds expectations, 2 = meets expectations, 3 = needs improvement, 4 = significantly deficient). Faculty are required to justify scores of 4 with a comment for the student clarifying the reason for the failing grade.

METHODS

In an effort to cause faculty to be more judicious in their assessments, a policy change was implemented requiring written justification for scores of 1. Grading distributions before and after this intervention were compared using chi-square.

RESULTS

Prior to the policy change, scores of 1 accounted for 81% of assessments, with scores of 2 representing 19%, contrary to normative expectations in educational assessment. Following the intervention, the distribution shifted significantly (χ^2, $p < .001$): 80% of grades were 2 (meets expectations) and 20% were 1, aligning more closely with expected norms. Review of accompanying comments indicated that while some were appropriate for a grade of 1, most were generic (e.g., "great job"), and a few suggested performance more consistent with a 3 (needs improvement).

CONCLUSION

Requiring justification for the highest rating reduced grade inflation and produced a more balanced distribution of scores. However, comment quality did not consistently align with observed performance. The change had the intended effect, but further faculty calibration is needed to ensure comments are specific, accurate and educationally meaningful.

46 | Nicole Francisco, DDS

PhD candidate
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Effect of Magnification Loupe on Visual Acuity and Working Distance: A Transnational Study with Dental Students

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OBJECTIVES

This study aimed to evaluate the visual acuity and working distance of dental students wearing 2.5× Galilean loupes across different stages of their education in two different countries.

METHODS

The participants included in this study were 200 dental students from Brazil, and 63 dental students from the United States. The response variables were visual acuity and the working distance between the student's magnification loupe lens and the mannequin's tooth. The independent variables were the country (Brazil and United States) and the academic level (pre-clinical, 1st clinical year, 2nd clinical year and 3rd clinical year). Visual acuity was measured using a miniature Snellen eye chart inserted into occlusal preparations on maxillary molars. The working distance was measured using the Measure App. A two-way analysis of variance was performed ($\alpha = 0.05$).

RESULTS

The results showed that, when analyzed independently, the country factor demonstrated a statistically significant difference. Brazilian students showed higher visual acuity ($p=0.005$) and higher working distance ($p=0.001$) when compared to U.S students.

CONCLUSION

It was concluded that Brazilian students, who were exposed to a comprehensive ergonomics training even without any experience wearing dental loupes, had better visual acuity and working distance than the American students, who had previous experience with magnification but limited training, regardless of their academic level.

47 | Huiting Luo

MASTER'S STUDENT
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Structural Analysis of a Collagen-Fibrin Scaffold which Promotes Osteogenic Differentiation and Templated Biomineralization of Dental Pulp Stem Cells

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OBJECTIVES

Clinical regenerative endodontic treatment (RET) studies report enhanced intracanal mineralization when collagen-based scaffolds are combined with blood, but the underlying mechanisms remain unclear. This study used a simplified in vitro collagen-fibrin model, incorporating fibrin, a key blood component, into collagen. The structural, chemical and mechanical properties of collagen-fibrin scaffolds were compared with those of the individual components and correlated with osteogenic differentiation and biomineralization by dental pulp stem cells (DPSCs).

METHODS

Collagen, fibrin and collagen-fibrin hydrogels were fabricated and characterized by Raman spectroscopy, cryo-scanning electron microscopy (cryo-SEM), atomic force microscopy (AFM) and oscillatory shear rheology. DPSCs were cultured on the scaffolds for up to 28 days without dexamethasone to isolate scaffold-driven effects. Osteogenic differentiation and mineralization were evaluated by qRT-PCR, Raman spectroscopy, Alizarin Red S (ARS) staining and SEM-EDX.

RESULTS

Collagen-fibrin scaffolds formed composite networks with increased modulus and distinct microstructure relative to the individual hydrogels. DPSCs cultured on collagen-fibrin scaffolds exhibited enhanced osteogenic differentiation, including increased expression of osteocalcin and bone sialoprotein. Although calcium phosphate formed on all scaffolds, collagen-fibrin composites uniquely supported templated, fiber-associated hydroxyapatite with crystallinity comparable to native bone.

CONCLUSION

This study provides a mechanistic basis for the enhanced intracanal mineralization observed when collagen-based scaffolds are combined with bleeding in clinical RET. The results show that the incorporation of fibrin reinforces and interconnects the collagen network, producing a mechanically reinforced scaffolds that promotes osteogenic differentiation and mineralization of DPSCs. These findings suggest this collagen-fibrin scaffold suggest a clinically relevant strategy to promote mineralized tissue formation within the root canal, and generally other treatment involving bone regeneration, particularly in cases where bleeding is limited.

48 | Viraja Vasam Reddy

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In-vitro Evaluation of Bacterial Adhesion and Anti-Microbial Efficacy of Various Bioceramic Sealers on Enterococcus faecalis

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OBJECTIVES

The aim of this study was to evaluate the adhesion and viability of Enterococcus faecalis (Ef) on stainless steel surfaces and on surfaces coated with different bio-ceramic root canal sealers, in order to assess their antimicrobial and anti-adhesive properties.

METHODS

Ef, cultured on brain heart infusion (BHI) agar, was suspended in BHI to approximately 1×10^7 CFU/mL in BHI and used to fill 8 small Petri dishes. Seven sterile stainless-steel squares coated with ether nail polish or one of six bio-ceramic sealers (Neo Sealer Flo, EZ Flo; EndoSequence Regular and HiFlow; Edge Bioceramic Regular and Thermal Flow); and an eighth square was left uncoated. Each square was immersed in a separate Ef-containing Petri dishes then incubated at 37°C for 30 minutes After rinsing with PBS, to remove non-adherent cells, squares were transferred to fresh sterile BHI and incubated for 1 hour. Bioceramic–coated squares were rinsed and processed for live/dead fluorescent staining and confocal laser scanning microscopy. The uncoated and nail polish–coated squares were placed in separate tubes containing 5 mL PBS, sonicated to detach adherent bacteria, and CFUs were quantified by serial dilution and plating on BHI agar.

RESULTS

The uncoated square bound approximately 5.4 x 105 CFUs and the nail-polish coated square bound 6.65 x 106 CFUs. In contrast, confocal microscopy revealed minimal bacterial adhesion to squares coated with bio-ceramic sealers, with only 1 – 2 cells or less per 200 square microns.

CONCLUSION

The results indicate that bio-ceramic root canal sealers provide unfavorable surfaces for E. faecalis adhesion and survival. This suggests that, in addition to their sealing ability, bioceramic sealers may contribute to reducing bacterial colonization within the root canal system, supporting their potential antimicrobial role in endodontic treatment.

49 | Nabila Tripti

MASTER'S STUDENT
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Novel Endodontic Intracanal Medication: Accelerated in Vivo Bone Renegeration

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OBJECTIVES

Study endodontic treatment sometimes fails due to persistent apical periodontitis. Calcium hydroxide (CaH), the most widely used intracanal medicament, shows limited antimicrobial activity, causticity and poor injectability and retrievability. To overcome these drawbacks, an injectable mixture of calcium hydroxide and salicylic acid encapsulated in a thermoreversible, light-curable hydrogel (CASA) was developed. Previous in vitro studies showed that CASA possesses antimicrobial properties, flowability and ease of removal. This study aimed to evaluate its in vivo bone-regenerative effects in a canine model.

METHODS

Eighteen single-rooted teeth in two beagles were evaluated over 22 weeks. In each dog, nine teeth were randomly assigned to three groups: CASA, CaH and non-medicated control. All teeth were infected with E. faecalis at week 2, cleaned, shaped, irrigated and medicated at week 8, and obturated at week 12. Cone-beam computed tomography (CBCT) scans were obtained biweekly for the first 14 weeks, then at weeks 18 and 22. The periapical region was analyzed using 3D-Slicer Software to calculate lesion volume. Lesion volume reduction (LVR) was expressed as a percentage relative to week 8. The Kruskal–Wallis test assessed group differences in LVR at each post-medication interval.

RESULTS

At two weeks post-medication, both medicated groups exhibited greater bone regeneration than the control. At six weeks, the CASA group showed significantly higher LVR ($p<0.05$) compared with CaH and control groups. This difference further increased through week 14, reaching high statistical significance ($p<0.02$). Final LVR values were 53±15% for CASA, 32±16% for CaH and 26±15% for control.

CONCLUSION

In conclusion, the CASA hydrogel promoted faster and greater periapical bone healing than both CaH and non-medicated treatments. These findings suggest enhanced antibacterial performance and potential bone-regenerative benefits, positioning CASA as a promising alternative to conventional intracanal medicaments.

50 | Fatehatul Jannat

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Bromelain and Bone Grafting Material Impact on Implant Surface Wettability

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THIS ABSTRACT HAS BEEN WITHDRAWN

51 | Ethan Lee

UNDERGRADUATE STUDENT
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Osteogenic Potential of a Calcium Hydroxide–Salicylic Acid for Dental Regeneration on Primary SCAP Cells

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OBJECTIVES

This study aims to evaluate the osteogenic potential of an injectable calcium hydroxide and salicylic acid (CASA) hydrogel for periapical infection. CASA was previously investigated for as a filling for root canal possessing antimicrobial resistance, and now it is proven to promote hard tissue regeneration.

METHODS

Cells extracted from the apical region of canine teeth were used as an in vitro model. Gene expression analysis of CD73, CD90 and CD105 indicated a stem cell population consistent with stem cells residing in the apical papilla (SCAP). Upon exposure to CASA, these cells exhibited enhanced mineralization, as demonstrated by Alizarin Red S staining. The deposited minerals were further characterized by quantitative rt-PCR, energy-dispersive X-ray spectroscopy (EDX), scanning electron microscopy (SEM) and Raman spectroscopy.

RESULTS

In vitro studies were performed using cells isolated from canine teeth. The Stem Cells residing in the Apical Papilla (SCAP)–associated markers CD73, CD90 and CD105 were examined at the gene expression level, confirming that the isolated cell population exhibits a SCAP-like phenotype. The CASA treated SCAP-like cells demonstrated progressive differentiation toward osteoblast- and osteocyte-like phenotypes. Biomineralization was confirmed by positive ARS staining, while EDX revealed the element of the biomineral deposits calcium and phosphate deposits with an approximate Ca:P ratio of 7:3. SEM further characterized the morphology of the cell secreted biomineral deposits. Raman spectroscopy identified characteristic vibrational signatures corresponding to hydroxyapatite and collagen, confirming the formation of bone-like mineralized matrix.

CONCLUSION

Collectively, these results establish a direct link between the physicochemical properties of the CASA hydrogel system and its ability to promote mineralized tissue regeneration in a apical papilla environment. The in vitro findings are consistent with the previously observed in vivo periapical regeneration, highlighting the potential of CASA as a multifunctional biomaterial for regenerative endodontic applications.

52 | Sumin Lee

UNDERGRADUATE STUDENT
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Osteogenic Differentiation of Human Primary Osteoblasts Induced by Calcium Hydroxide–Salicylic Acid

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OBJECTIVES

Injectable dental biomaterials that promote osteogenic regeneration are of significant interest for clinical translation. Following the successful demonstration of osteogenic mineralization induced by a calcium hydroxide and salicylic acid (CASA) in canine for both in vitro and in vivo, this study aims to evaluate whether similar osteogenic effects can be reproduced in human primary osteoblasts, thereby assessing the translational potential of CASA for human applications.

METHODS

Primary osteoblast cells were acquired from commercial company. Upon exposure to CASA, the cell cultured tissue were examined by quantitative rt-PCR and Alizarin Red S (ARS) staining. The energy-dispersive X-ray spectroscopy (EDX), scanning electron microscopy (SEM), Raman spectroscopy and Fourier-transform infrared spectroscopy (FTIR) were used for characterizing the osteogenic effect.

RESULTS

The qPCR results demonstrated progressive maturation of the osteoblasts by high levels of bio-marker expression. In addition, the osteoblast were further differentiated into osteocyte. Bulk biomineralization was confirmed by positive ARS staining, while EDX revealed calcium and phosphate element ration in 7:3. SEM characterizes the morphology of the cell-secreted mineral deposits. Moreover, Raman spectroscopy identified characteristic vibrational bands corresponding to hydroxyapatite and collagen, which shows the formation of bone-like composites on the matrix. The differentiated cell cultured tissue was further confirmed by the FTIR, and the collagen peaks were co-localizing with the calcium ones.

CONCLUSION

CASA induces osteogenic mineralization in human primary osteoblasts, demonstrating that its osteoinductive effects are not limited to dental stem cell–derived models or just in canine. These findings support the translational potential of CASA as an injectable osteogenic promoting material for human dental and bone regenerative applications.

53 | Lingjie Pan

UNDERGRADUATE STUDENT
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Collagen as a Biophysical Transducer of Static Magnetic Fields in Dental Pulp Stem Cell Differentiation

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OBJECTIVES

Dental implants are widely used to replace missing teeth; however, successful implant integration with bone regeneration remain challenging due to insufficient osteogenic differentiation. Static magnetic fields (SMFs) have emerged as a noninvasive strategy to enhance bone healing and osseointegration. Collagen-based scaffolds provide a biomimetic matrix that supports cell adhesion and tissue remodeling but exhibit limited osteoinductive capacity. This study aims to investigate the individual and combined effects of collagen scaffolds and SMF stimulation on dental pulp stem cells (DPSCs) osteogenic differentiation and biomineralization using tissue culture plastic as a control.

METHODS

Dental pulp stem cells (DPSCs) were cultured for 28 days under four conditions: tissue culture plastic (TCP), collagen scaffolds, TCP with static magnetic field (SMF) exposure and collagen scaffolds with SMF exposure. DPSCs were cultured under osteogenic media without other induction factor (e.g. dexamethasone) for up to 28 days. Osteogenic differentiation and biomineralization were assessed using quantitative real-time PCR (qPCR) and SEM-EDX.

RESULTS

From the qPCR and SEM-EDX results, DPSCs showed markedly different responses to applied static magnetic fields in response to their microenvironment. On TCP, SMF exposure suppressed the expression of late differentiation and biomineralization markers (OCN, BSP) and produced spare, disorganized mineralization. In contrast, when DPSCs were cultured on collagen, SMF exposure markedly enhanced differentiation, upregulating OCN and BSP and yielded highly ordered, collagen templated hydroxyapatite mineralization.

CONCLUSION

Our preliminary findings suggest that collagen substrates act as critical transducers of biophysical magnetic cues. This study points out the importance of biologically relevant matrix environments when evaluating static magnetic field–based strategies and supports the potential of collagen-based scaffolds combined with SMF to enhance peri-implant bone formation and osseointegration.

54 | Alyssa Pasciuta

UNDERGRADUATE STUDENT
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Povidone-Iodine vs. Chlorhexidine for Preoperative Decontamination: Systematic Literature Analysis

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OBJECTIVES

To compare the effectiveness of chlorhexidine (CHX) and povidone-iodine (PVI) in preoperative intraoral and perioral decontamination.

METHODS

A literature review was conducted using PubMed, Google Scholar and the Stony Brook University Library. Over 1,600 articles on oral decontamination were screened, with approximately 100 specifically addressing CHX or PVI. After applying inclusion and exclusion criteria, 15 relevant studies (randomized trials, cohort studies, systematic reviews and meta-analysis) were selected for analysis.

RESULTS

Of the fifteen studies reviewed, four directly compared CHX and PVI, consistently favoring PVI. Four other investigations reported lower postoperative infection rates with PVI alone, while six studies highlighted inconsistent clinical performance and reduced reliability of CHX. One periodontal surgery study found saltwater to be equally effective as CHX, further questioning CHX's necessity. Across studies, the mean postoperative complication rate following CHX use was 6–8%, compared to 3–4% with PVI, reflecting an approximate 45–50% relative reduction. In controlled oral surgery trials, postoperative bacteremia reached 40% in CHX-treated patients versus only 20% with PVI, confirming a 50% reduction in bloodstream bacterial contamination. PVI also achieved >90% bacterial load reduction and shortened mucositis duration from 9.3 to 2.8 weeks, while ICU data linked CHX use to increased sepsis (OR 1.37) and mortality (OR 1.25).

CONCLUSION

Current evidence indicates that povidone-iodine provides more consistent antimicrobial results and lower postoperative complication rates than chlorhexidine, supporting its use as the preferred preoperative antiseptic.

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Phototherapy in Oral Muco-cutaneous Lesions: An Analysis of Laser and LED Therapy

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OBJECTIVES

This systemic review seeks to evaluate the clinical effectiveness of laser-based phototherapy in the management of oral mucosal cutaneous lesions.

METHODS

The review was conducted using PubMed, Google Scholar and Scopus (January 2000-May 2025). All published studies included randomized controlled trials and a series of cases that focused on individuals who were treated with LLLT or LED therapy for oral mucosal cutaneous lesions. The data regarding treatment guidelines, clinical results and side effects were extracted and synthesized.

RESULTS

Fifteen of the studies that met the criteria for inclusion included six controlled clinical trials, five prospective case series and four case reports. Conditions that were treated included pemphigus vulgaris, oral lichen planus, Hailey-Hailey disease, vesiculobullous disorders, chemotherapy or radiation-induced oral mucositis and others. For the majority of these studies, there were statistically significant decreases in pain with an increase in speed of lesion healing. This trend was seen primarily with the use of diode lasers in the 630-660 nm wavelength range. There was little to no report of adverse side effects, and those that were reported were of short duration.

CONCLUSION

Evidence currently supports PBMT as an adjunctive or alternate therapy to treat lesions on the oral mucosa and skin around it through a safe means. However, since there is a great deal of variance between different people receiving PBMT for oral mucosal and skin lesions, it is essential to develop a standard protocol for providing PBMT therapy and to conduct larger, more reliable clinical trials.

Notes

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