



SCHOOL OF
DENTISTRY

Wednesday April 10, 2024 **32nd Annual**

RESEARCHDAY 2024

Keynote Speaker

Jane Weintraub, DDS, MPH



CONGRATULATIONS

to the Indiana University School of Dentistry
Research Day award recipients and participants.

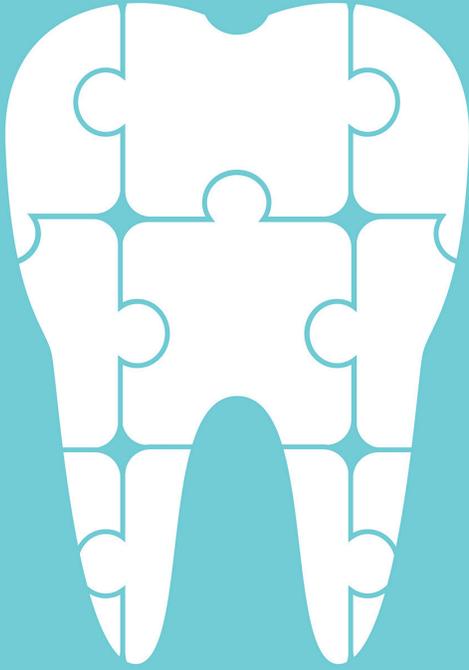


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IUSD RESEARCH DAY PROCEEDINGS

VOLUME 32

APRIL 10, 2024

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Research Day Monograph Editor **Keli Seering**

Cover Design **Sydney Barrett and Terry Wilson**

EVENT SCHEDULE

THURSDAY MARCH 28, 2024 - IU SCHOOL OF DENTISTRY

5:00 p.m.-8:30 p.m. Student Research Awards Competition

WEDNESDAY APRIL 10, 2024 - IUPUI CAMPUS CENTER (CE) 4TH FLOOR

11:00 p.m. Vendor Exhibits Open (CE 450A)

12:45 p.m.-12:50 p.m. Welcome Remarks (CE 450B-C) **Dr. Carol Anne Murdoch-Kinch**
Dean, IU School of Dentistry

12:50 p.m.-1:00 p.m. IU Indianapolis Research Overview **Dr. Phaedra S. Corso**
Vice Chancellor for Research
IU Indianapolis

1:00 p.m.-1:10 p.m. IU School of Dentistry Research Update **Dr. Tien-Min Gabriel Chu**
Associate Dean for Research
IU School of Dentistry

1:10 p.m.-1:15 p.m. Introduction of Keynote Speaker **Dr. E. Angeles Martinez Mier**
Associate Dean for Global Engagement,
Professor & Chair of Dental Public Health &
Dental Informatics, IU School of Dentistry

1:15 p.m.-1:45 p.m. Keynote Address:
The Hunt to Understand & Prevent
Oral Disease: Clinical trials,
tribulations and other research
adventures **Dr. Jane A. Weintraub**
R.G. Rozier & C.W. Douglass Distinguished
Professor and Former Dean of UNC Chapel
Hill Adams School of Dentistry, AADOCR
Immediate Past President

1:45 p.m.-1:55 p.m. Announcement of Faculty and Staff Awards **Dr. Carol Anne Murdoch-Kinch**
Dean, IU School of Dentistry

1:55 p.m.-2:10 p.m. Announcement of Student Awards and Student Research Presentations **Dr. Chandler Walker**
President-elect, Indiana Section, AADOCR

2:10 p.m.-2:35 p.m. Announcement of Research Recognition and Awards and Student Research Presentations **Dr. Angela Bruzzaniti**
Director of Student Research and Director of
PhD Training & Research Development,
IU School of Dentistry

2:35 p.m.-3:00 p.m. Announcement of Research Poster Presentation Awards **Dr. Chandler Walker**
President-elect, Indiana Section, AADOCR

3:00 p.m.-4:30 p.m. Research Poster Presentations & Clinical Case Poster Presentations CE 405, 406, 409 **Research Day Participants & Presenters**

4:30 p.m. Removal of Posters



IUPUI

SCHOOL OF DENTISTRY

OFFICE OF RESEARCH

Indiana University
Indianapolis

April 10, 2024

Dear Colleagues:

Welcome to the 32nd Annual Indiana University School of Dentistry Research Day!

Today, we come together to celebrate our students and faculty's research achievements in this past year. Research has always been at the heart of IUSD's vision and mission. More than ever, we strive to foster collaborative research efforts between the students, faculty, staff, research collaborators, and industrial partners to continue our efforts in enhancing our care for the general population's oral health needs.

The importance of our research mission is exemplified by the American Chemical Society's National Landmark Dedication that took place at IU Bloomington just a few days ago celebrating the invention of stannous fluoride as one of the most important achievements in the history of the chemical sciences. The collaborative research efforts by the IU Department of Chemistry, School of Dentistry, and Procter & Gamble decades ago are still impacting the oral health of millions of people today. On this 2024 IUSD Research Day, we carry on that same spirit and tradition to push our profession forward with the new knowledge presented in today's research posters and clinical case presentations which I trust you will find both inspiring and forward-thinking.

For today's guest speakers, I would like to welcome Dr. Phaedra Corso who assumed the role of the Vice Chancellor for Research in this past year to share with us her vision of research at IU. We are honored to welcome Dr. Jane Weintraub, the former Dean of the University of North Carolina Adams School of Dentistry, and an outstanding dental public health scholar, to be our keynote speaker today to share her experience and her scholarly work in the understanding of oral diseases.

I want to thank Dean Murdoch-Kinch for her unwavering support of this annual event. I also want to thank the Research Day Planning Committee and the Indiana section of the American Association for Dental, Oral, and Craniofacial Research for the excellent planning and execution of this annual event. Thank you also to our sponsors who help support this important day.

Finally, I invite you to enjoy this research day to learn and to be inspired by our speakers and by the presentations from our students, staff, and faculty.

Best wishes to all of the 32nd annual IUSD Research Day participants!

Sincerely,

Tien-Min Gabriel Chu DDS PhD
Professor and Associate Dean for Research



April 10th, 2024

Dear Research Day Attendees,

On behalf of the Organizing Committee and the Indiana Section of the American Association for Dental, Oral, and Craniofacial Research (IN-AADOCR) I enthusiastically welcome you to the Indiana University School of Dentistry (IUSD) 32nd Annual Research Day.

The Indiana Section serves as the regional link to national (AADOCR) and international (IADR) dental research associations. IN-AADOCR focuses on advancing basic and clinical research in dental, oral, and craniofacial sciences, aiming to improve oral health and treat related diseases. By fostering collaboration among professionals, including researchers and clinicians, we aim to enhance the impact of our findings and promote better methods for preventing and treating oral conditions.

IN-AADOCR organizes and supports various initiatives, including inviting esteemed speakers from diverse dental disciplines, in collaboration with the remarkable backing of IUSD. These efforts culminate in our annual Research Day, a platform for investigators and students to showcase advancements in basic and clinical dental, oral, and craniofacial research within the local community. Research Day not only facilitates knowledge exchange among peers but also offers opportunities for engagement with sponsors, vendors, faculty, and student investigators. It stands as a testament to the ongoing dedication to research excellence at IUSD.

We extend our gratitude to the Research Day Committee for their commitment to this annual tradition at IUSD. We're thrilled to welcome researchers from the IU-Fort Wayne Dental Hygiene Program to share their groundbreaking research at Research Day for the second year. Their contributions enrich Indiana's dental research landscape, and we are proud to showcase their efforts. A special thank you to our judges for their valuable participation in the student research competitions. And to all attendees of the 32nd IUSD Research Day, we encourage you to recognize and celebrate the impactful research conducted by your peers and colleagues.

Sincerely yours,

A handwritten signature in blue ink, appearing to read "Chandler L. Walker".

Chandler L. Walker, PhD
President-Elect, IN-AADOCR
Co-Chair, Research Day Planning Committee

ABOUT OUR KEYNOTE SPEAKER DR. JANE A. WEINTRAUB



Dr. Jane A. Weintraub recently served as the 51st President of the American Association of Dental, Oral and Craniofacial Research (AADOCR). She is first R. Gary Rozier and Chester W. Douglass Distinguished Professor in Dental Public Health and former Dean at the University of North Carolina at Chapel Hill Adams School of Dentistry, and adjunct professor in the UNC Gillings School of Global Public Health.

Dr. Weintraub is a diplomate of the American Board of Dental Public Health and past president of the American Association of Public Health Dentistry. Her epidemiology and health disparities research cuts across the lifespan with a focus on prevention and relationships among oral health, healthcare, and systemic disease.

She has received the International Association for Dental Research H. Trendley Dean Memorial Award for meritorious research in epidemiology and public health, the American Dental Association's Norton Ross Award for Clinical Research, the John W. Knutson Award from the American Public Health Association's Oral Health Section and many others.

Dr. Weintraub earned her DDS at Stony Brook University and her MPH and public health training at Harvard University. She was inducted as a Fellow of both the American and International College of Dentistry and was in the first class of AADOCR Fellows. Earlier in her career, she practiced dentistry in Boston, MA.

The keynote address is titled **“The Hunt to Understand and Prevent Oral Disease: Clinical trials, tribulations and other research adventures.”** In this presentation, Dr. Weintraub will share some highlights of her professional journey and adventures across the country, starting as a pre-dental student just beginning her research career. She has focused on conducting oral epidemiology and clinical research with implications for preventing oral disease and improving access to dental care. Her clinical trial experiences include dental sealants (a long-term follow-up study of one of the first clinical trials), plantibody to prevent dental caries (the first US clinical trial), and fluoride varnish (the first US study in pre-school children to test its efficacy to prevent early childhood caries). She will describe a process followed after obtaining favorable clinical trial evidence to promoting changes in health policies and dental practice. Her research has focused on both ends of the age spectrum, with recent studies focused on the oral health and access to care for older adults.

RECOGNIZING EXCELLENCE 2024 AWARDS

DENTAL HYGIENE STUDENTS

IU Indianapolis Dental Hygiene Research Day Award

IU Fort Wayne Oral Health Research Award

PREDOCTORAL DENTAL STUDENTS

AADOCR Student Research Day Award

Cyril S. Carr Research Scholarship

Dean's Award for Research Excellence

Dentsply Sirona/AADOCR SCADA Award Program - Selected Participant

IDA Student Research Award

King Saud University Travel Award for Predoctoral Student Research

Predoctoral Student Best Clinical Case Report Award

Recognition of Outstanding Research Engagement

Research Honors Program - Certificate of Achievement

GRADUATE DENTAL STUDENTS

Delta Dental Award for Innovation in Oral Care Research

King Saud University Travel Award for Best Clinical Case Report

King Saud University Travel Award for Graduate Student Research

King Saud University Travel Award for PhD Student Research

Maynard K. Hine Award for Excellence in Dental Research

The Stookey Trailblazer Student Researcher Award

The Stookey Preventive Dentistry Research Award

STAFF

IUSD Research Staff Award

FACULTY

IU School of Dentistry Alumni Association Distinguished Faculty Award for Research

The Stookey Trailblazer Faculty Researcher Award

RESEARCH DAY PLANNING COMMITTEE

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Abstracts

Research Poster Presentation **CARIOLOGY**

P01 Fluoride Content of Infant Formula Commercially Available in Central Indiana. A. ALTAMIMI*, A. SOTO-ROJAS, G. ECKERT, E.A. MARTINEZ-MIER, F. LIPPERT (Indiana University School of Dentistry)
There is a paucity of data on the fluoride (F) content of powder infant formula available in the US, despite evidence indicating its contribution to potentially excessive levels of exposure in infants and young children. This study determined F content of infant formula (n=20) sold in grocery stores in central Indiana, prepared using three types of water (Purified-0.0 ppm F, Nursery-1.0 ppm F, and Tap-0.7 ppm F) to determine if they fall within safe intake levels. Samples were reconstituted with these waters. F concentrations in all samples were determined using the microdiffusion method. We calculated an estimated mean F intake assuming infants were solely fed on formula and compared these values to the adequate intake (AI) and upper tolerable limits (UL) of F for infants aged 0-6 and 7-12 months, respectively. Two-way ANOVA statistical analysis was used. The interaction effect between infant formula brands and the type of water used was significant at $\alpha=0.050$ level. Formulas reconstituted with tap water would result in an estimated mean F intake of 0.202 to 0.132 mg/kg/d which was greater than formulas reconstituted with nursery water (0.176 to 0.116 mg/kg/d). Formulas reconstituted with purified water had the lowest estimated mean fluoride intake of 0.064 to 0.008 mg/kg/d. Infant formulas when reconstituted with purified water decreased the chance of infants exceeding UL levels for both age groups but increased the chance of exceeding AI levels for infants aged 0-6 months. All tested infant formulas reconstituted with nursery and tap water were found to increase the chance of infants exceeding AI and UL. Conclusion: Infant formulas vary in their fluoride content; however, the type of water used for reconstitution has a greater impact on the fluoride exposure levels for infants solely fed on formula.

P02 Effect of Experimental Polymer-Containing Solutions against Cariogenic Demineralization. R.M. GARCIA*¹, A.C. VALDIVIA-TAPIA², T. SCARAMUCCI¹, F. LIPPERT², A.T. HARA² (¹University of Sao Paulo, ²Indiana University School of Dentistry)
Objectives: To investigate *in vitro* whether experimental solutions containing different polymers (Chitosan: CHI, Sodium linear polyphosphate: LPP, Polyacrylic acid: PAA; and 2-methacryloyloxyethyl phosphorylcholine: MPC), associated or not with fluoride (F), stannous ion (Sn), or fluoride plus stannous ions prevent caries-like lesion formation in enamel determined using a single-section model for digital transverse microradiography. Materials and methods: Enamel single sections were prepared and randomly assigned (n=7) into 20 groups: Distilled water (DIW, negative control), 220 ppm F, 800 ppm Sn, F+Sn, 0.5% CHI, 2% LPP, 0.1% PAA, and 2% MPC associated or not to F, Sn, or F+Sn. The single sections were individually subjected to five days of pH cycling regimen (net demineralization model) with a daily cycling procedure consisting of two 3-h exposures to a demineralizing solution, between three 1-min exposures to the experimental solutions, and exposure to artificial saliva at all other times. The single sections were then analyzed using digital transverse microradiography (integrated mineral loss- ΔZ). Data were analyzed using one-way ANOVA followed by Tukey Test, at 5% significance level. Results: CHI+F+Sn presented the highest protection (lowest ΔZ value; mean \pm standard deviation; vol% \times min \times μ m; 720 \pm 591), whereas PAA provided the least (4565 \pm 1217). The tested polymers did not differ from the negative control (DIW) when used in isolation ($p>0.05$). However, they did not interfere with the protection afforded by F. Among polymers, LPP provided better protection than MPC and PAA ($p<0.05$), and none of them differed from CHI ($p>0.05$). Sn did not provide any protection in isolation or when associated with polymers. There were no differences between solutions containing polymers+F+Sn vs. F+Sn vs. F vs. polymers+F ($p>0.05$). Conclusions: The tested polymers did not provide protection against enamel demineralization when used in isolation. However, when associated to fluoride or fluoride plus stannous ions, the polymers exhibited promising effects in protecting enamel against demineralization.

P03 Acidic/Abrasive Challenges on Non-Carious Cervical Lesions: Formation, Progression, and Morphology. G.C. DENUCCI¹, C.P. TURSSI², G. ECKERT³, A.T. HARA¹ (¹Indiana University School of Dentistry, ²São Leopoldo Mandic Dental Institute, ³Indiana University School of Medicine)

Objectives: While the impact of toothpaste abrasivity and toothbrushing abrasion on non-carious cervical lesions (NCCLs) is well-documented, the effect of acid challenges on their initiation, progression and morphology remains understudied. This *in vitro* investigation assessed how frequency of erosive challenges and duration of toothbrushing abrasion influenced NCCLs development. Additionally, we sought to compare the morphology and internal angles of lesions formed under the test protocols. Materials and methods: Experimental units were prepared using extracted human premolars and randomly assigned to four erosive-abrasive test protocols (n=16): A. No acid exposure (negative control), B. acid exposure every 2500, C. 5000 and D. 15000 brushing strokes (STK). All groups were brushed for a total of 55000 STK. Three-dimension digital images of the teeth were captured at baseline and after 15000, 35000 and 55000 STK, using an intraoral scanner (TRIOS4, 3Shape). A software (WearCompare, Leeds Digital Dentistry) was used to analyze volumetric tooth loss (mm³) by superimposition followed by subtraction analysis. Lesion angle was calculated (ImageJ, NIH) and morphology visually classified by a single examiner. Data were analyzed using ANOVA and Fisher's Exact tests adopting two-sided 5% significance level. Results: Overall, no difference in tooth loss was observed among the different frequencies of exposure (p>0.05). Tooth loss increased with STK, for each erosive-abrasive test protocols (p<0.001). Exposure to acid significantly increased tooth loss (p<0.001), regardless of brushing interval (p<0.001). Control had significantly sharper lesion angle (59°) than all acid-exposed groups (~145°) (p<0.001), and significantly different lesion shape with 94% wedge-shaped lesions versus 0%, respectively (p<0.001). Exposure to acid was associated to presence of more striated lesions. Conclusions: Simulated NCCLs developed and progressed differently and more rapidly in the presence of acidic challenges, regardless of their frequency. Exposure to acid impacted the morphology of the lesion.

P04 Anticaries Effects of Fluoride, Arginine, and Strontium in Chemical/Microbial Models. L. HAZZAZI*, G.C. DENUCCI, B.H. PANARIELLO, S. DUARTE, G.J. ECKERT, F. LIPPERT (Indiana University School of Dentistry)

Objective: The aim of this study was to evaluate the anticaries effect of fluoride (F), strontium (Sr), and arginine (Arg) in chemical and dual-species microbial models. Methods: In the chemical model, artificial enamel caries lesions were pH cycled for 5 days with three daily treatments. Experimental groups were: deionized water (DIW), 226 ppm F (F), 452 ppm F (2F), 100 ppm Sr, 2% Arg (Arg), F+Sr, F+Arg, Sr+Arg, F+Sr+Arg. In the microbial model, a dual-species biofilm consisting of *Actinomyces naeslundii* ATCC12104 and *Streptococcus mutans* UA159 were used to form biofilm on sound enamel specimens. The experimental phase lasted 5 days, with treatments 2x/day. Experimental groups were: DIW, F, Sr, Arg, F+Sr+Arg. All lesions were characterized using Vickers surface microhardness (VHN). In the microbial model, biofilms were analyzed for log CFU of both bacteria and total biofilm dry weight. Data were analyzed using one-way ANOVA (chemical model) or both one-way ANOVA and Kruskal-Wallis tests (microbial model). Results: Chemical model: Δ VHN (mean±standard deviation/statistical groups) were: DIW/-23±56/a; F/18±39/ab; 2F/64±55/b; Sr/-21±31/a; Arg/9±85/ab; F+Sr/24±23/ab; F+Arg/31±40/ab; Sr+Arg/-12±40/a; F+Sr+Arg/39±44/ab (p≤0.005). Microbial model: Post-VHN were: DIW/240±87/a; F/210±89/a; Sr/227±59/a; Arg/224±95/a; F+Sr+Arg/180±71/a (p≤0.005). *A. naeslundii* log CFU/mg (mean±standard deviation/statistical groups) were: DIW/4.0±1.7/b; F/5.1±1.2/b; Sr/5.1±2.0/b; Arg/4.6±1.8/b; F+Sr+Arg/1.7±1.6/a. (p<0.0001). *S. mutans* log CFU/mg were: DIW/6.2±0.9/a; F/6.4±0.8/a; Sr/6.0±1.3/a; Arg/5.6±1.5/a; F+Sr+Arg/5.5±1.2/a. (p<0.1906). Total biofilm dry weight (mean±standard deviation statistical groups; all mg) were: DIW/1.0±0.6a; F/1.1±1.2/a; Sr/0.6±0.3/a; Arg/1.2±1.0/a; F+Sr+Arg/1.3±0.8/a (p<0.2553). Conclusion: The combined treatment of F+Sr+Arg showed promising anticaries effect *in vitro*, especially in the presence of a cariogenic biofilm.

P05 Comparison of Methods to Determine Total and Soluble Fluoride from Dentifrices. G. TAMAYO-CABEZA*, A. VALDIVIA-TAPIA, E.A. MARTINEZ-MIER, F. LIPPERT (Indiana University School of Dentistry)
Objective: To evaluate and compare different methods for measuring total (TF) and total soluble fluoride (TSF) concentrations in dentifrices against declared label values. Methods: TF and TSF content in nine commercially available dentifrices were determined using various analytical methods, including ADA Tests 1 and 2a, FDA Tests 1, 3, 16, and 29, and the Direct Acid-Hydrolysis Method (DM). Dentifrices with varying fluoride compounds (sodium fluoride, stannous fluoride, or sodium monofluorophosphate) and concentrations were selected. The methods involved diluting dentifrice samples, mixing, centrifuging, and analyzing the fluoride content using a combination fluoride ion-specific electrode, with adaptations for different fluoride compounds. The fluoride measurements obtained were compared against declared label values, considering a 10% discrepancy margin. Statistical analysis was conducted using one-way ANOVA with Tukey's HSD post-hoc test to evaluate method-dependent variability in fluoride content measurement. Results: Except for ADA Test 1 and the DM, which reported TF concentrations above the declared values for certain products, the measurements from all tested methods were within a 10% discrepancy of the label claims. Specifically, ADA Test 1 exceeded declared TF concentrations in products with 1000 ppm fluoride, and DM did so in products with 955 ppm fluoride. For TSF, the DM exceeded, while ADA Test 2a and FDA Test 29 reported below the declared values for products with 1100 ppm fluoride. Statistically significant differences were identified across methods for both TF and TSF, suggesting method-dependent variability in fluoride measurement. Notably, for dentifrices labeled with 955 ppm, 1000 ppm, and 1100 ppm fluoride, substantial discrepancies were observed. The results suggest that although most analytical methods reflected a fluoride content within a 10% discrepancy of label claims, significant method-dependent variability observed in the measurement of TF and TSF indicates the necessity for further studies on the inter-method agreement on fluoride content assessment in dentifrices.

P06 Silver Diamine Fluoride Promotes Demineralization Protection after a Secondary Acid Challenge. M. TUDARES*¹, G. ECKERT², F. LIPPERT¹ (¹Indiana University School of Dentistry, ²Indiana University School of Medicine)

Silver diamine fluoride (SDF) has antimicrobial and enamel hardening effects, representing a feasible choice for caries prevention and treatment. However, the mechanism of action of SDF during cariogenic progression is not completely understood, especially regarding its action on caries lesions of different depths, or whether it offers additional protection after a secondary acid challenge compared to fluoride varnish (FV), the current gold standard for non-surgical caries treatment. In this study we hypothesized that the effects of SDF treatment on experimental cariogenic enamel lesions of three different severities (1-h/24-h/144-h) will be comparable to those of FV on staining, Vickers surface microhardness (%SMHchange), integrated mineral loss $\Delta(\Delta)Z$ and lesion depth ($\Delta)L$ after a second demineralization challenge. Methods: Human 4x4 mm enamel samples underwent color and SMH measurements at baseline and after lesion creation, treatment application, artificial saliva incubation (16-h), and secondary demineralization (48-h). Transverse microradiography analysis (TMR) followed. A 2-sided t-test with a 5% significance level was used for statistical analysis at baseline and a two-way ANOVA subsequently after initial lesion creation. Results: SDF negatively stained the enamel in 24-h and 144-h lesions after treatment and after 48-h demineralization. The %SMHchange_{post treatment} for FV vs. SDF was 7.2 vs. -67.1 ($p<0.05$) for 24-h lesions and -3.2 vs. -43.5 ($p<0.05$) for 144-h lesions with more positive values indicating enamel softening. The %SMHchange_{post 48h} for FV vs. SDF was -6.4 vs. -33.1 ($p<0.05$) for 24-h lesions and -4.4 vs. -47.2 ($p<0.05$) for 144-h lesions. 144-h lesions treated with DIW, FV, or SDF had $\Delta(\Delta)Z$ of -87, 166 and 405 vol%min $\times\mu$ m respectively ($p>0.05$) with negative values representing more mineral loss. 144-h lesions that received FV vs. SDF had ($\Delta)L$ values of -10.5 vs. -6.1 μ m respectively, indicating more shallower lesions with SDF. Conclusions: SDF may have comparable benefits to FV in enamel mineral loss prevention.

P07 3D-Intraoral Scanner as an Auxiliary Tool for Dental Hard-Tissue Conditions. A.C. VALDIVIA-TAPIA*¹, S. LARA¹, G.C. DENUCCI¹, F. LIPPERT¹, G.J. ECKERT², A.T. HARA¹ (¹Indiana University School of Dentistry, ²Indiana University School of Medicine)

Objectives: This in vitro study aimed to compare the direct (visual exam) versus indirect (exam on 3D-colored digital images) assessments of ICDAS (dental caries), BEWE (erosive tooth wear), and TF (dental fluorosis) indices performed on the occlusal surfaces of extracted human teeth, for the detection and severity differentiation of dental caries, erosive tooth wear, and fluorosis lesions. Materials and Methods: Extracted human teeth were selected, targeting teeth/surfaces with all codes of each index. They were mounted according to the anatomical position in preclinical dental typodont models (28 models/n=453 occlusal surfaces) and evaluated by a single, previously trained, and calibrated examiner (kappa statistics > 0.91, against gold standards). For the direct assessment, teeth were examined visually under standardized lighting and hydration conditions. For the indirect, the models were scanned with an intraoral scanner (TRIOS 4, 3Shape), and 3D images were generated and later analyzed under standardized conditions of magnification and color using the 3Shape Unite software. The kappa statistics and the percent agreement were calculated between the direct and indirect assessments. Results: Overall, the weighted kappa value/percentage of agreement between the assessments was 0.72/64% for ICDAS, 0.70/73% for BEWE, and 0.75/86% for TF. General overestimation and underestimation for the scores of each index were as follow: 22% and 11% for ICDAS; 16% and 11% for BEWE; 6% and 9%, for TF, respectively. Conclusion: In conclusion, there was moderate overall agreement between the direct and indirect assessments of the studied dental hard-tissue conditions. This indicates that the 3D-colored digital images can be useful as an auxiliary tool for detecting dental-hard tissue conditions and differentiating their severity level.

Research Poster Presentations *DENTAL EDUCATION*

P08 Dental Students' Attitudes and Experiences towards ICDAS in IUSD Clinics. I. ALFAWAZ*, A.E. SOTO-ROJAS, L. AL DEHAILAN, L. WILLIS (Indiana University School of Dentistry)

Background: The International Caries Detection and Assessment System (ICDAS) was implemented at Indiana University School of Dentistry (IUSD) to teach dental students to detect and assess severity of dental caries. Scores range from 0 (sound) to 6 (extensive cavitation). Objective: This study aims to explore the knowledge and learning experience of ICDAS of third-year (D3) and fourth-year (D4) dental students at IUSD and evaluate how they utilize it in clinics. Material and Methods: The student investigator and committee members developed a questionnaire to assess the knowledge and use of ICDAS in the clinic. The initial questionnaire was piloted, reviewed by faculty and alums, and evaluated by the Center for Survey Research. IRB was obtained. The questionnaire included both open-ended and Likert scale questions to assess students' attitudes, knowledge, perceptions, and potential behavioral modifications regarding the ICDAS. Qualtrics was utilized to deliver this anonymous questionnaire to D3 and D4 dental students. The responses were collected and subjected to statistical analysis using Mantel-Haenszel chi-square tests. Results: 75 of 229 dental students (32% of D3 and D4) completed the survey, which was acceptable for analysis. This group had 40% D3 and 60% D4 respondents. D4 dental students were more confident identifying ICDAS score 1 lesion ($p=0.041$). Students with prior experience were less likely to correctly identify an ICDAS score of 3 ($p=0.034$), and ICDAS 4 ($p=0.010$). 93% of the dental students stated that ICDAS scores influenced the treatment. Four ICDAS scoring systems were discussed, and ICDAS caries stages helped 90% of dental students choose preventive or restorative treatments. Negative statements, such as having too many scores, difficulty understanding and learning ICDAS, and being inadequate for the clinical setting, were rejected by over 90% of students. Conclusion: Third- and fourth-year dental students at IUSD learn well from ICDAS clinical practice and demonstrate adequate knowledge.

Research Poster Presentations *DENTAL HYGIENE*

P09 Navigating Oral Health Challenges in Individuals with Cleft-Palate: Comprehensive Review. R. ALEXANDER*, W. ALMALAHI, R. KATHARY, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Introduction: Cleft palate, a congenital condition characterized by a gap or opening in the roof of the mouth, presents significant challenges for individuals in terms of oral health and care. Purpose: This narrative review aims to provide a comprehensive overview of the effects of cleft palate on oral health and highlight the implications for oral care practices. It emphasizes the necessity for patient education and support for cleft palate patients and their families to promote effective oral care. Discussion: Complications associated with cleft palate encompass a spectrum of challenges, ranging from speech difficulties and impaired swallowing to heightened susceptibility to dental ailments and facial growth abnormalities. Notably, dental complications in cleft lip patients manifest in various forms, including multiple missing teeth, impaction, supernumerary teeth, microdontia, and delayed crown and root development, alongside a higher prevalence of dental caries. As we chart a course for future research, tracking patients' oral health progression from childhood into adulthood emerges as a critical endeavor, offering insights that can inform targeted interventions and promote sustained oral well-being among individuals with cleft palate.

P10 Investigating the Impact of Sports Participation on Oral Health. T. BROWN*, S. SHAFFER, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Introduction: The relationship between sports participation and oral health is a subject of considerable interest, particularly regarding the comparison of oral health outcomes between athletes and non-athletes. The concept of "better" oral health encompasses a range of indicators, including probing depths, incidence of dental caries, plaque accumulation, number of missing teeth, and adherence to nutritional needs. This inquiry is especially relevant due to the widespread involvement in physically demanding recreational activities, where individuals may have heightened exposure to sugary sports drinks, potentially impacting their oral health. Additionally, the nutritional habits and frequency of dental appointments among athletes are significant factors influencing their oral health status, alongside the inherent risk of oral trauma in certain activities, notably contact sports. Discussion: A review of existing literature on oral health and athletes underscores the imperative of educating athletes about maintaining optimal oral health. Two primary protective measures against potential oral health risks emerge: the use of mouthguards to prevent oral injuries and the moderation of sugary drink consumption during physical activity. Furthermore, regular dental care and the application of fluoride are critical in safeguarding athletes' oral health against environmental factors that may lead to demineralization of their dentition. Conclusion: Athletes encounter unique oral health challenges stemming from their involvement in physically demanding activities, which can expose them to heightened risks such as oral trauma and unhealthy dietary habits. By educating athletes on oral health maintenance, employing protective measures like mouthguards, and advocating for healthy dietary practices, these risks can be mitigated, contributing to improved oral health outcomes. Moreover, prioritizing routine dental care and fluoride application can provide further protection for athletes' oral cavities against environmental threats, ultimately fostering overall oral health and well-being within this population.

P11 Dental Hygiene Education beyond the Clinic: A Practicum Experience at McMillen Health. M. CHATMAN*, C. STEPHENS, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: McMillen Health, established in 1981, stands as a non-profit organization dedicated to advancing the belief that education today paves the way for a healthier tomorrow. Serving as one of the few remaining independently operated health education centers nationwide, McMillen Health has played a pivotal role in the Fort Wayne community, extending its impact to a national scale with programs reaching nearly all 50 states. The organization's mission revolves around delivering essential and impactful preventive health education, with a focus on promoting physical, social, and emotional well-being among the community. Case: This study presents the experience of a senior dental hygiene student at Indiana University School of Dentistry-Fort Wayne who undertook a fieldwork practicum at McMillen Health. The immersion in this community-oriented setting has offered valuable insights into the broader landscape of dental hygiene beyond a private practice-based environment. The practicum has served as a platform to apply accumulated

knowledge from three years in the dental hygiene program, enhancing confidence in patient interactions within the clinical setting. Conclusion: Graduates in dental hygiene have diverse career paths available, ranging from community-based roles and research to private practice settings. As an advocate for experiential learning, the author contends that every dental hygiene student should partake in a fieldwork practicum. Such experiences have the potential to broaden career objectives and contribute to enriching communities with enhanced healthcare education and support. This perspective underscores the importance of incorporating practical experiences into dental hygiene education, fostering well-rounded professionals who can positively impact both individuals and communities.

P12 Exploring Ergonomic Solutions for Musculoskeletal Health in Dental Hygiene Practice. J. DIAZ*, B. BAIZE, S. STERRETT, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Introduction: Musculoskeletal disorders (MSDs) are conditions affecting muscles, bones, tendons, and ligaments, often leading to pain and restricted movement. Dental hygienists commonly experience MSDs, particularly in regions like the neck, shoulders, and upper back due to prolonged periods of sitting and repetitive tasks, jeopardizing their work effectiveness and potentially leading to early career cessation. Purpose: This narrative review comprehensively examines research on ergonomic interventions to prevent MSDs in dental hygienists and investigates their influence on career longevity. Discussion: Ergonomic improvements reduce work-related injuries and chronic pain among dental hygienists, bolstering job satisfaction and productivity. Proactive measures mitigate physical strain, supplemented by therapeutic exercises and preventive strategies like regular breaks and ergonomic assessments to manage and prevent MSDs. Conclusion: Ergonomics plays a critical role in promoting dental hygienists' well-being and career sustainability. Implementing ergonomic measures enhances job satisfaction, productivity, and professional longevity, underscoring their significance in dental practice.

P13 Evaluating Educational Interventions for Children's Oral Health Literacy. M. GLASSBURN*, M. MILLER, E. PEARSON, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background/Purpose: The evaluation of oral health education programs has garnered increased attention, especially concerning children who are at the outset of their oral health journey. Recognizing the significance of providing oral health education to children, our research aims to assess the effectiveness of such programs in enhancing oral health literacy among young individuals. Methods: Utilizing a pretest-posttest research design, we evaluated the effectiveness of oral health education in elementary-aged children (7 to 8 years old) with low health literacy. Our intervention included presentations and hands-on activities. Prior to our intervention, we administered a pretest survey to assess students' baseline knowledge of oral health. Results: Among the 40 participants, initial findings revealed that only 50% brushed their teeth twice daily. However, after our educational intervention, this figure increased to 90%. Furthermore, hands-on activities successfully demonstrated the impact of dietary choices on oral health, with all students recognizing fruits and vegetables as beneficial options. Discussion: Our study underscores the positive impact of oral health education on children, as evidenced by improvements in oral health behaviors and knowledge. The findings highlight the importance of early intervention in promoting oral health literacy among young individuals. Conclusion: In conclusion, our research provides compelling evidence of the effectiveness of oral health education in enhancing oral health knowledge and behaviors among elementary-aged children. These findings underscore the importance of incorporating comprehensive oral health education programs into school curricula to promote long-term oral health outcomes among young individuals.

P14 Exploring the Therapeutic Potential of Propolis in Dentistry. H. HOOLEY*, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Introduction: In the realm of modern dentistry, the exploration of natural alternatives has gained traction, with propolis, a bee resin, emerging as a particularly promising candidate. Renowned for its multifaceted therapeutic properties, including antiviral, antibacterial, and anti-inflammatory effects, propolis presents an intriguing avenue for oral health enhancement. Purpose: This narrative aims to provide a comprehensive review of the potential applications of propolis in oral health care, exploring its effectiveness in combating oral infections, improving periodontal health, and its broader implications in dental practice. Discussion: Propolis, enriched with antimicrobial compounds like flavonoids, phenolic acids, and terpenes, holds significant promise

in combating oral infections and promoting oral health. Its antibacterial properties target a broad spectrum of oral pathogens, contributing to the reduction of plaque formation and bacterial colonization on the teeth and gums. This action not only helps alleviate periodontal inflammation but also aids in preventing the progression of periodontal disease. Furthermore, propolis's ability to control the growth of cariogenic bacteria, such as *Streptococcus mutans*, underscores its potential in mitigating dental caries incidence. By disrupting the bacterial balance within the oral cavity, propolis serves as a valuable natural remedy for promoting oral health and preventing common oral conditions. Further research is warranted to elucidate the specific mechanisms underlying propolis's therapeutic effects and to optimize its formulations for enhanced efficacy in dental care. Conclusion: Propolis presents a cost-effective and environmentally friendly option in dental care, harnessing nature's benefits alongside contemporary techniques. Its potential to enhance oral health calls for further research and clinical utilization in dental practice.

P15 Addressing Oral Health Disparities in Juvenile Detentions through Sealant Programs. A. LESTER*, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: Sealant programs are widely implemented in schools across the nation, yet they remain notably absent in juvenile detention centers where access to proper dental care is limited for many adolescents. Compounded by the prevalence of risky behaviors among detained youth, the likelihood of dental caries is significantly elevated. While fluoride in dental products and fluoridated water offers some protection for tooth enamel, the posterior dentition often requires additional preventive measures. Sealants emerge as a valuable tool for preventing decay or halting the progression of occlusal incipient lesions on posterior teeth. Purpose: This research provides a comprehensive review of oral health care needs among adolescents within juvenile detention centers, a demographic already at high risk for dental caries. When combined with factors such as lower socioeconomic status and institutional residence, this risk is further exacerbated. Additionally, the benefits and barriers to implementing a sealant program within juvenile detention centers will be explored. Discussion/Conclusion: The dental hygiene profession stands to benefit from implementing sealant programs in juvenile detention centers by extending services to disadvantaged populations. Providing dental care to underserved communities and educating them about proper oral hygiene practices are vital steps toward improving their oral health outcomes. Furthermore, community dental programs, particularly those involving dental hygienists, present opportunities to advocate for general supervision within the scope of practice, thereby enhancing access to preventive dental care for vulnerable populations.

P16 Oral Health Crisis in Post-War Bosnia and Herzegovina. N. MUHAMEDAGIC*, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: Bosnia and Herzegovina faced a devastating war and genocide from 1992 to 1995, resulting in significant loss of life and displacement of millions based on religious and ethnic identities. The aftermath of the conflict has left deep scars, including severe oral health challenges exacerbated by limited access to dental care and competing priorities. Aims: This research aims to quantify the extent of the oral health crisis in Bosnia and Herzegovina, highlighting the urgent need for support and aid in addressing prevalent oral health disparities. Methods: A review of PubMed studies spanning from the immediate post-war period to the present day was conducted. These studies primarily focused on children and included clinical examinations assessing indices such as DMFT (Decayed, Missing, Filled Teeth) and dmft (decayed, missing, filled teeth in primary dentition). Results: The studies consistently reveal alarmingly high caries rates and a significant lack of access to oral healthcare services across Bosnia and Herzegovina. These findings underscore the profound impact of the war and genocide, disrupting the previously robust healthcare system and exacerbating disparities in oral health care access. Socio-economic challenges and geographic barriers further hinder access to dental care, particularly in rural areas, resulting in untreated dental caries and other oral health issues among many citizens, particularly children. Conclusion: The findings emphasize the urgent need for dental aid and increased awareness of the enduring consequences of war. Prioritizing access to comprehensive dental care is essential to address oral health challenges in Bosnia and Herzegovina, necessitating humanitarian assistance and advocacy efforts to improve oral health outcomes in post-conflict regions.

P17 The Oral Health Implications of Adolescent Vaping. B. STEELE*, R. JORDAN, E. PILARSKI, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: The importance of oral hygiene in maintaining systemic health is often underestimated, particularly among adolescents who may prioritize social acceptance over health behaviors. Peers and societal pressures heavily influence adolescent behavior, potentially leading to detrimental habits, such as vaping, which can have profound implications for oral health. Purpose: This study aims to investigate the oral health effects of vaping in adolescents, focusing on the composition of vapes and e-cigarettes, associated oral complications, and strategies for healthcare professionals to support vaping cessation among young individuals. Discussion: Vaping has gained popularity among adolescents, driven by factors like peer influence and perceptions of social acceptance. However, the contents of vaping devices pose significant risks to oral health, including dry mouth, oral irritation, periodontal disease, and dental caries. The addictive nature of vaping compounds the challenge, making cessation efforts crucial for promoting oral and overall health among adolescents. Conclusion: Understanding the oral health implications of vaping in adolescents is paramount for healthcare professionals in guiding effective prevention and intervention strategies. By addressing the addictive nature of vaping and educating adolescents on the potential oral health risks, healthcare providers can play a pivotal role in supporting vaping cessation and promoting oral hygiene practices among this vulnerable population.

P18 Improving Life Quality for Individuals with Parkinson's Through Oral Care. B. STRAND*, K. HAMMAN, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: Parkinson's disease is a neurodegenerative disorder characterized by progressive deterioration of motor function, often resulting in tremors, rigidity, and impaired movement. Beyond motor symptoms, Parkinson's can also affect various aspects of oral health, presenting challenges such as difficulty swallowing, excessive drooling, and decreased saliva production. Dental hygienists play a pivotal role in addressing these oral complications and supporting individuals with Parkinson's disease to maintain oral health and quality of life. Purpose: This review investigates the oral complications associated with Parkinson's disease and explores the role of dental hygienists in mitigating these challenges. It aims to assess the effectiveness of therapeutic dental services, modified tools, physical therapies, and medications in alleviating oral complications and maintaining oral health in Parkinson's patients. Discussion: The use of medications to manage Parkinson's symptoms can lead to oral issues, exacerbating the disease's impact on oral health. Additionally, the motor impairments and cognitive decline associated with Parkinson's disease can hinder oral hygiene practices, further predisposing patients to oral complications. However, through the implementation of therapeutic dental services, adapted tools, physical therapies, and medications, there is potential to improve oral health outcomes and enhance patients' oral health-related quality of life. While more research is needed to evaluate the efficacy of these interventions, preliminary evidence suggests positive correlations between oral health improvements and the implementation of modifications tailored to Parkinson's patients' needs. Conclusion: Addressing the oral complications of Parkinson's disease requires a multifaceted approach involving dental hygienists and interdisciplinary healthcare teams. By utilizing therapeutic interventions and modifications tailored to the unique needs of Parkinson's patients, dental professionals can play a vital role in mitigating the negative impact of the disease on oral health and improving patients' overall well-being. Further research is warranted to enhance our understanding of the effectiveness of these interventions and optimize oral health outcomes in Parkinson's patients.

P19 Strategies for Enhancing Oral Health Practices among College Students. M. THOMPSON*, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Introduction: College students often grapple with stress, busy schedules, and overwhelming academic pressures, leading to the neglect of essential needs such as oral health care. Factors contributing to the lack of preventive oral care among this demographic include a perceived absence of dental issues, financial constraints, and time limitations. Purpose: This research seeks to explore and articulate the prevalent deficiency in oral health care awareness and practices among college students. Methods: Utilizing previous clinical and observational research, the study examined the prevalence of disease and decay within the college-aged population. In addition, cross-sectional surveys were distributed to current Indiana University Fort Wayne and Purdue Fort Wayne students to gain insights into the perceived importance of oral health

among the targeted demographic. Discussion/Conclusion: This study underscores a concerning pattern wherein college students frequently neglect oral health care until problems manifest. Dental hygienists play a pivotal role in addressing this issue through proactive health promotion activities. By actively engaging with college students and promoting preventive oral care measures, dental hygienists can contribute to a shift in perception and behavior. Implementing educational campaigns, workshops, and regular check-ups within the college environment can enhance awareness and encourage proactive oral health practices.

P20 Exploring Oral Health Education Needs in Mothers and Children. A. GODOY*, M. YOUNG, M. DAVIS, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: Healthier Moms and Babies is a non-profit organization committed to enhancing the future of our community by advocating for the health and safety of mothers, infants, and families. This organization offers a range of programs, resources, and educational initiatives at no cost to its participants. Methods: A cross-sectional study was undertaken, involving in-person pre- and post-surveys administered to a randomly selected group of participants affiliated with Healthier Moms and Babies. These surveys encompassed a range of domains, such as demographic information, general knowledge of oral hygiene care, professional dental care, oral hygiene routines, and strategies for preventing early childhood caries, the significance of sealants, and an overall assessment of oral health. Utilizing data obtained from the pre-survey, educational materials and presentations were subsequently developed. Results: A total of ten subjects from Healthier Moms and Babies participated in the study, with nine completing both pre- and post-surveys. The mothers' ages ranged from 23 to 37 years, while the children's ages ranged from 6 months to 6 years. Eight participants demonstrated a clear understanding of the purpose of sealants and the recommended frequency for their child's oral hygiene routine. One participant highlighted the importance of not allowing their child to swallow fluoride as a key takeaway. All nine participants rated the presentation and information provided as extremely useful. Conclusion: Maintaining proper oral hygiene and care is multifaceted, particularly for mothers responsible for their own and their children's well-being. Access to educational resources through organizations like Healthier Moms and Babies can play a pivotal role in promoting oral health habits within communities, thereby contributing to overall community health improvement.

P21 Assessing Periodontal Disease Susceptibility through Saliva Testing. K. CROW*, J. KLEPPER, M. SCHULTZ, A. LAMPHERE (Indiana University School of Dentistry Fort Wayne)

Background: The oral cavity harbors a diverse bacterial ecosystem, predisposing it to various diseases, including the prevalent periodontal disease. This condition, marked by periodontium destruction, including the gingiva and supporting structures, poses significant oral health challenges. Early detection and intervention are pivotal in preventing or mitigating periodontal tissue damage. Saliva testing offers a non-invasive means to assess the oral microbiome and identify individuals at risk of periodontal disease. Objective: This study aims to assess the efficacy of saliva testing in detecting periodontal disease-associated bacteria. With over 700 bacterial species inhabiting the oral cavity, it presents a complex environment prone to various diseases, including periodontal disease. Understanding saliva's bacterial composition can yield valuable insights into periodontal disease risk and facilitate preventive measures to mitigate tissue destruction. Results: Data analysis revealed a compelling association between specific bacterial strains in saliva and the onset of periodontal disease. These findings underscore saliva testing's potential for early detection, paving the way for proactive interventions such as personalized oral hygiene regimens and targeted periodontal therapies. These strategies aim to mitigate periodontal disease progression effectively. Conclusion: Saliva testing emerges as a valuable tool in identifying individuals at risk for periodontal disease by detecting periodontal pathogens' presence. By enabling early intervention and personalized preventive measures, saliva testing contributes significantly to preserving periodontal health and preventing tissue destruction.

P22 The Effects of Oral Contraceptives on the Periodontium. A. BOGARD*, S. HENNINGER, T. POWELL (Indiana University School of Dentistry)

Introduction: Oral contraceptives (OCPs) are widely used by about 50 million women worldwide. OCPs primarily contain two types of hormones, progesterone, and estrogen. OCPs create high levels of hormones throughout the body which attack the body's ability to maintain health. The objective of this study was to identify the alterations OCPs have on the periodontium. Methods: We searched through PubMed with the MeSh terms "oral contraceptives" or "periodontium" or "gingivitis". The articles range from 1974-2023. There were 5 articles we found that supported our clinical question. These studies included cross-sectional, clinical trials, and systemic reviews. Across the board, the studies took groups of women (ranging from 50-171 participants). They measured plaque and sulcular bleeding index scores, probing depths, and clinical attachment loss before and after the use of oral contraceptives. Results: These studies revealed that the use of oral contraceptives does affect the periodontium when it comes to plaque accumulation, gingival bleeding, and clinical attachment loss. The results supported negative effects when the OCPs were used for a longer duration (1.5-3 years). The significant difference between control groups and OCP users in many of the studies was not statistically significant enough to conclude a clear correlation between hormonal contraceptives and periodontal disease. Conclusion: Overall the use of oral contraceptives in women can have a negative effect on the clinical features of the periodontium but not enough to correlate it to periodontal diseases. The lack of oral health education of the women in these studies is supported by the increase of plaque buildup and gingival inflammation shown in the results. As a dental hygienist, it is our job to thoroughly explain the importance of at-home oral hygiene with the use of OCPs to help reduce the risk for signs and symptoms of diseases in the periodontium.

P23 Managing Plasma Cell Gingivitis: Treatment Overview. S. LONG*, M. BROCK, M. CORNEWELL (Indiana University School of Dentistry)

Plasma cell gingivitis (PCG) is a rare inflammatory condition characterized by diffuse, fiery red gingival tissues that bleed easily on provocation, with a predominance of plasma cells. Dental healthcare professionals should be familiar with the clinical presentation of plasma cell gingivitis to ensure accurate diagnosis and effective treatment, as it is frequently mistaken for aggressive periodontitis. The most common causative agents of plasma cell gingivitis are the allergens known to cause hypersensitivity reactions in the tissue. Such allergens include cinnamon, red pepper, chewing gums, mint, and certain components of toothpaste. Initial management of plasma cell gingivitis includes meticulous oral hygiene practices and avoidance of potential triggers. Dental healthcare professionals must have a thorough understanding of the toothpaste ingredients that can potentially cause gingival irritation in order to guide patients toward suitable alternatives. Topical corticosteroids such as triamcinolone acetonide are first-line therapy, providing relief when applied directly to the affected tissues. Adjunctive therapies such as antihistamines or immunomodulatory agents can be beneficial, especially in cases associated with allergic or immunological conditions. Long-term management involves regular follow-up to monitor disease activity, treatment response, and address complications or recurrence. Collaboration among healthcare providers is crucial for optimizing outcomes and improving patients' quality of life. In conclusion, a multimodal approach combining oral hygiene measures, topical and systemic pharmacotherapy, and patient education is essential for effectively treating and managing PCG.

P24 Access or Barrier to Care: Medicaid and Periodontally Involved Adults G. RUIZ-LOPEZ*, K. RADKAY, M. CORNEWELL (Indiana University School of Dentistry)

Medicaid provides health and dental coverage to Americans, including low-income adults, children, pregnant women, elderly adults, and people with disabilities based on eligibility requirements such as age, income, family size, and health status. Indiana Medicaid consists of many different plans, such as the Healthy Indiana Plan (HIP), Hoosier Care Connect, and Traditional Medicaid. This review strives to raise awareness of access care issues that low-income adults face. A serious public health challenge is maintaining oral health. Low-income adults disproportionately face greater barriers to accessing dental care and are more likely to suffer from poor oral health than other adults. This barrier to care can result in adults becoming periodontally involved, which can lead to chronic periodontitis. Periodontitis is an inflammatory process that affects the protective and supportive tissues around the tooth and that roughly affects one-third of the U.S. population. Diagnosis and treatment of periodontitis at its initial stages is essential to avoid more challenging and costly

severe stages of the disease. A publicly available cross-sectional study from the 2008 National Health Interview Survey reported an inability to afford dental care, severe tooth loss, and severe periodontitis. The study used robust econometric techniques and an instrumental variable estimation method. The prevalence of reported inability to afford dental care, severe tooth loss, and severe periodontitis were 11.9%, 8.5%, and 14.3%, respectively. Periodontitis can ultimately lead to tooth loss, which plays a role in decreased quality of life and longevity. Indiana Medicaid provides little to no coverage for the treatment of periodontitis. In conclusion, the reality of Indiana Medicaid is that it becomes a barrier to care concerning low-income periodontally involved adults. Bringing awareness to this access of care issue could be the first step to hopefully improving disease management and prevention of periodontal disease progression in Hoosiers.

P25 Therapeutic Application of Cannabis in Dentistry: A Systematic Review. A. WATSON*, E. CERVANTES, B.G. HERNANDEZ, T. POWELL (Indiana University School of Dentistry)

The cannabis plant has been widely used throughout history for therapeutic purposes. Cannabinoids are a group of substances found in the cannabis plant. The most common are Δ^9 tetrahydrocannabinol (Δ^9 -THC), cannabidiol (CBD) and cannabinol (CBN). Both natural and synthetic cannabis-based products have gained attraction for their use in dentistry. The objective of our study is to analyze the current research regarding the oral benefits of CBD and to highlight its uses in dentistry. Using the keywords “cannabis and therapeutic dentistry” and “cannabinoids and dentistry”, we considered randomized controlled trials and systematic reviews. Participants of any age were considered. No publication dates were applied. In the in vitro studies on rats it was found that cannabis has anti-inflammatory, anti-microbial, and anti-cancer properties. In the randomized control trial with 60 patients, it was found that the application of CBD formulation improved the condition of masticatory muscles in patients with myofascial pain. Cannabis may also be useful in treating toothaches, periodontal disease, caries, oral and salivary gland cancers, burning mouth syndrome, and dental anxiety. CBD has a role in healing and tissue regeneration. It has antibacterial properties and can be beneficial in treating periodontal inflammation and periodontitis. The analgesic properties also help with myofascial pain and burning mouth. The data available demonstrates that cannabis can have therapeutic uses in dentistry, but there needs to be more clinical studies to evaluate cannabis.

P26 Achieving Efficient Care Management/OHI for Patients with Alzheimer’s disease. G.Z. ZERING*, H.M. MCCOY, T. RADER (Indiana University School of Dentistry)

Introduction: The management of patients with varying impairments can be challenging. However, treating patients with Alzheimer’s disease in the dental office can pose obstacles that are unique to the condition. This case report will focus on common oral health defects in patients living with Alzheimer’s disease, systemic health risks relating to poor oral health in these patients and will detail how the oral health care provider can effectively educate the patient and their caregiver on effective oral hygiene at home. Malnutrition, xerostomia, dysphasia, and dysphagia are among some of the most common oral health threats to a patient with Alzheimer’s disease. These threats need to be addressed accordingly, with both the patient and the caregiver, if there are signs of oral health decline. During oral health education, it is important to get the caregiver involved with the patient’s oral health routine. The provider must clearly state the importance of supervised brushing/flossing due to progressive cognitive decline and dexterity deficits. It is imperative to take life-expectancy and patient decline into account when providing dental care; the oral healthcare professional must prioritize procedures based on need and patient ASA (classification of the patient’s health status). Taking potential systemic health risks resulting from poor oral health into account is also imperative when determining treatment priorities. Recognizing that exceptional oral hygiene can play a large role in the quality of life for an Alzheimer’s patient is crucial for the dental healthcare professional to emphasize and the caregiver to successfully uphold. Sufficient dental health education balanced with compliance by both the caregiver and the patient is critical for the success of maintaining the oral health of a patient with Alzheimer’s disease.

Research Poster Presentations *DENTAL IMPLANTS*

P27 Development of 3D Printed Models for Implant Placement Teaching: Step-By-Step Guide. S. SUBRAMANYAM^{*1}, K. SUKHMANTHOT¹, G. LIEDKE², P. WONG¹, V. DUTRA¹ (¹Indiana University School of Dentistry, ²Federal University of Santa Maria)

Introduction: Pre-clinical implant education relies on standard prefabricated models. Custom models that can represent anatomical and clinical variations of patients are more expensive and sometimes unavailable. Objective: This project aims to design and 3D print a custom 3D training implant model based on a patient's specific anatomy using free software. Methods: An anonymized DICOM dataset of a patient missing tooth number #9 was used. Using several free software (Meshmixer, Blueskyplan, and Cura), the authors created a 3D-printed model for pre-clinical implant education. A step-by-step guide using conventional and AI tools is described to create a single model for immediate and delayed implant placement (tooth number #9), including tooth extraction (Tooth number #8). The model was printed using an FDM 3D printer (Ultimaker S5, Ultimaker, Netherlands) and Pearl White PLA Material (Ultimaker, Netherlands). Results: A detailed anatomical model was produced, and tooth extraction (site #8) was performed, resulting in 2 edentulous sites for immediate and delayed extraction training. The model can be used for free-hand or guided surgery and graft simulation. Customization can be easily done digitally according to the educational need, including the creation of dehiscence, fenestration, root position, etc. The total material cost of the model is around 5 dollars. Conclusion: The step-by-step guide proposed by the authors generated a low-cost, high-quality, highly customizable 3D-printed implant education model in cases of immediate and delayed implant placement, including tooth extraction.

P28 The Accuracy of Tilted and Axial Guided Implant Placement. B. FREEMAN^{*1}, H. ALQALLAF¹, C. YANG¹, W. LIN¹, V. DUTRA¹, Y. HAMADA² (¹Indiana University School of Dentistry, ²University of California Los Angeles)

Introduction: Accuracy of guided implants has been ascertained in fully edentulous implants, but there has not been an evaluation of the accuracy of intentionally tilted implants. Aim: The aim of this lab-based study is to compare the accuracy of tilted to axial implants using a guided surgical approach in an edentulous model. Material and Method: Fourteen rubber-coated mandibular models were scanned with fiducial markers using a commercial benchtop scanner, followed by Cone Beam Computed Tomography (CBCT) for implant planning through a dual-scan protocol. In the control group, each model was planned for four axially oriented implants. Conversely, the experimental models were planned for two axially oriented implants near the lateral incisors and two posteriorly tilted implants at a 30-degree angle. A mucosal-supported, pin-retained surgical guide was designed and printed which facilitated the fully guided implant placement. Immediately after implant placement by a board-certified periodontist, all implants received scan bodies and were rescanned for evaluation of the trueness between the planned and the actual implant location using the implant planning software. Mixed model ANOVA was used to detect differences between groups with regards to Angular Deviation, Offset at Base, and Offset at Tip. Results: No significant differences were observed between the experimental and control groups in terms of Angular Deviation ($p=0.7001$), Offset at Base ($p=0.6409$), or Offset at Tip ($p=0.6931$). Conclusion: Intentionally tilted implants may not be less accurate using a fully guided protocol than axially oriented implants.

Research Poster Presentations *DENTAL INFORMATICS*

P29 Investigating the Impact of Patient Portal on Patient Intake Process. D. DEVIREDDY^{*}, S. LI, T. THYVALIKAKATH (Indiana University School of Dentistry)

Many dental practices are using patient portals to improve the quality and access to care. Understanding the impact of patient portals to clinical processes is critical for successful implementations. In this study, we focused on the patient intake process to investigate the impact of patient portal. The objectives were to model and compare with and without portal patient intake processes at an academic dental clinic and to identify gaps and bottlenecks. There are three steps in the study. First, we interviewed clinical staff and IT experts at the academic clinic regarding its patient intake processes before and after the implementation of the patient portal. We learned about the steps and actions in the processes and collected their feedback and comments.

Second, we modeled both processes using the Business Process Model and Notation (BPMN) method. This step helped us to understand the impact of the portal on patient intake process. Third, we analyzed the portal patient intake process to identify gaps and bottlenecks and proposed a revised process and improvement suggestions on the portal. There were three patient intake process models created in this study, the without portal model, the current with portal model, and the revised with portal model. By analyzing the first two models, we can see the impacts of patient portal on the intake process, such as speeding up information collection, avoiding missing documentation, reducing errors due to difficulty deciphering patient handwriting, and shortening appointment time. The revised model targeted on simplifying and streamlining the process to encourage more patient engagement and satisfaction with the patient portal. We also identified new features to support the revised process. Conclusion: The models can help to understand the impact of patient portal to intake process and provide the foundation for further patient portal and process improvements.

P30 Leveraging Natural Language Processing to Screen Superficial Oral Mucosal Lesions.

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Objectives: A gold standard data set was developed to establish a natural language processing pipeline to screen superficial oral mucosal lesions (SOMs) among Sjögren’s disease (SD) patients and compare them with controls (non-SDs) in electronic dental records (EDRs). Further, association of SD diagnosis with SOMs manifestations, referral rate upon recognizing SOMs to specialists were determined. Methods: Dental clinical notes from 180 patient EDRs were retrieved. An annotation schema with four classes (SOMs, signs and symptoms of dry mouth, treatment for xerostomia, and referral to specialists), attributes and attribute values were inductively created along with annotator guidelines. Descriptive statistics summarized the two groups. Fisher’s exact tests were used to compare between the SD and control patients. Referral rate and presence of SOMs before and after the diagnosis of SD were also computed. A two-sided 5% significance level was used for all comparisons. Results: Totally, 69 records were annotated by three annotators. Of the 47 patients with SD, 28 presented with SOM lesions. Half of these patients presenting with lesions had them prior to their SD diagnosis. Additionally, 17 of 28 of patients (61%) had no referral to a specialist, while only one patient had a referral prior to their first SOM. SD patients were more likely to have signs/symptoms of dry mouth (p=0.039), treatments for xerostomia (p=0.003), and treatment using cholinergic agonist if receiving treatment for xerostomia (p=0.032). SD patients were less likely to have treatment using OTC mouth rinse/spray if receiving a treatment for xerostomia (p=0.046). There was no significant difference in the presence of SOM lesions between SD and non-SD patients (p=0.598). Likewise, there was no significant difference (p=0.735) in the referral rate of patients with SOM lesions between the SD and non-SD patients. Conclusion: The necessity for dental screening of SOM lesions remains integral to the process of early intervention for SD patients. (The study was supported by NIH/NIDCR grant R21 DE027786-02 and 1R56DE029195)

Class	Cases (N=47)			Controls (N= 22)		P value
	Findings	Frequency	%	Frequency	%	
Superficial mucosal lesions	Present	28	60%	15	68%	0.598
	Absent	19	40%	7	32%	
Signs/symptoms of dry mouth	Present	32	68%	9	41%	0.039*
	Absent	15	32%	13	59%	
Treatment for xerostomia	Present	24	51%	3	14%	0.003*
	Absent	23	49%	19	86%	
Referral to specialist (all patients)	Present	15	32%	4	18%	0.265
	Absent	32	68%	18	82%	
Referral to specialist (limiting to patients with SOM lesions)	Present	10	36%	4	27%	0.735
	Absent	18	64%	11	73%	

P31 Investigate Dentists' Needs and Expectations in Patient Medical Summary Application.

B. CHERIYAN, S. LI*, T.P. THYVALIKAKATH (Indiana University School of Dentistry)

Objective: Patient medical information is critical for dentists to make clinical decisions. However, several studies have found issues in patients reported medical histories. This study aimed to understand dentists' information needs and expectations in a newly developed Patient Medical Summary (PMS) application, which can retrieve patient medical information from a Health Information Exchange (HIE). Methods: We conducted 23 informant interviews. Each of these semi-structured interviews had two sections. First, participants followed a think-aloud protocol to review up to six patients' medical information using PMS and to make clinical decisions regarding whether the patients were fit for standard dental procedures. Second, participants answered nine open-ended questions and completed a system usability scale (SUS) questionnaire. All interview sessions were recorded. The audio transcripts were imported into NVivo for qualitative analysis, and the video recordings were further reviewed manually. Results: Three themes emerged from the audio transcripts review: information needs, information display and arrangement, and clinical decision-making. Under information needs, ten categories of information were identified. Under information display and arrangement, we collected participants' feedback on location/position, grouping/sorting, and display font/color/style of different information items and their comments on PMS functions such as "Show All", "Trend", "Filter", and "Expand". We gathered the participants' clinical decisions regarding dental procedures, including restoration, oral prophylaxis, scaling and root planning, tooth extraction, wisdom tooth extraction, and implant placement, under the clinical decision-making theme. Further manual review of the video recordings revealed that participants frequently cross-checked different categories of information. We also learned that most of the participants spent the longest time reviewing patients' medical conditions. The average SUS score was 75. Conclusions: Dentists generally held positive attitudes toward PMS and acknowledged the benefit of such an application. The study findings can help to understand dentists' information needs and expectations in PMS and further improve the application. (Supported by NIDCR 5R01DE031259)

P32 Application of Evidence Gap Map Method Focused on Teledentistry.

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The use of information and communication technologies (ICT) by society is improving and reaching various professional segments, including dentistry. After the COVID-19 crisis, due to mobility sanitary restrictions, the modality of clinical virtual assistance gained propulsion. Therefore, the number of scientific publications aiming to address it has grown as well. Considering this scenario, methods to identify, evaluate and critically categorize these papers such as Evidence Gap Maps (EGM) have been used, adopting different resources during its whole workflow, such as Rayyan, Amstar and Tableau. Just articles published as Systematic Reviews (SR) were selected in this study, and SR is already a complex and detailed method. So, applying EGM in scientific literature can have a crucial role in serving as a reliable, dense, but comprehensive overview to researchers as well as clinicians. Specifically considering the dental field of study, the term teledentistry is used to identify a broad number of activities, with different inputs and outcomes. This EGM is directed to teledentistry, presenting evidence on the applicability and the effects, for health and education outcomes. From a comprehensive bibliographic search, 68 systematic reviews were included in the map. The confidence level of the reported evidence was analyzed, resulting in 19 reviews with a high level of confidence, 4 reviews with a moderate level, 10 reviews with a low level, and 35 reviews with a critically low confidence level. And represents the evidence that analyzed the effect of 43 interventions, organized into 8 groups: Combined interventions; e-Learning and teleducation; teleconsultation and teleservice; telemonitoring; telediagnosis; telescreening; TICs; and Artificial Intelligence. The significant prevalence of studies which level of confidence was "critically low" (35 reviews) and demonstrates the need for better designed studies aimed at implementing teledentistry in clinical services and in education.

Research Poster Presentations *DENTAL MATERIALS*

P33 Conversion in Light-Cured Resin Cement across Zirconia Shades and Thicknesses. P. KARIMI*, T.G. CHU (Indiana University School of Dentistry)

This study explores the impact of zirconia thickness and optical properties, encompassing shade, translucency, and transmittance, on the degree of conversion of light-cured resin cement. Ceramic specimens derived from Zirconia CAD (Katana UTML) in shades EA1, EA2, and EA3. Seventy-five specimens were milled from CAD-CAM material discs and polished using an EcoMet1000 (Buehler). The zirconia specimens underwent sintering within a furnace (Sintra Pro; Shenpaz). These specimens were then divided into thicknesses of 1, 1.25, 1.50, 1.75, and 2.00 mm, with five samples in each thickness category. Panavia veneer light-cured resin cement was administered into a mold beneath the ceramics, and the light-cure tip was positioned atop the ceramics to cure the cement. Following a 24-hour storage period, the resin cement was prepared for FTIR analysis by pressing them with KBr to generate pellets. The degree of conversion was measured using peak heights of 1637 cm^{-1} (C=C) and 1540 cm^{-1} (N-H) as internal reference peak. To assess the optical properties, a spectrophotometer (CM-2600D; Konica Minolta Sensing Americas, Inc) was utilized to determine the translucency parameter (TP) at the center of each specimen. A spectrophotometer (MARC Resin calibrator; Bluelight Analytics, Inc) and an LED unit (Bluephase) were employed to measure light transmittance. The degree of conversion ranged from 62% to 36%, with the highest percentage observed for the A1 shade. A decrease in the degree of conversion was noted for thicknesses exceeding 1 mm. Absorption coefficients ranging from 0.616 to 0.948 mm^{-1} were identified. A linear relationship between the translucency parameter and the degree of conversion was observed for each shade. This relationship was found to follow a consistent curve, contingent on the shade and thickness. It was concluded that light-cured resin exhibits an acceptable degree of conversion up to a thickness of 1 mm for the A1 shade in zirconia 5-YTZP.

P34 Fatigue and Fracture Toughness of a Printed Ceramic Hybrid Material. E. ROBERTS*, J. PLATT, D. MORTON, T-M.G. CHU (Indiana University School of Dentistry)

In 2021, the FDA approved Varseosmile Crown Plus (BEGO GmbH & Co. KG, Germany). This novel composite material is the first additive manufactured material to receive approval as a ceramic hybrid for permanent single crowns, inlays, onlays and veneers. The objective of this study was to test the fatigue strength and fracture toughness of Varseosmile Crown Plus relative to a control polymer matrix composite, Vita Enamic. Methods: Step Stress fatigue was assessed by loading at 15N increments to failure or 245,000 cycles at 20Hz on disc shape specimens (n=10). Fracture toughness was assessed with the single edge v-notch beam method on bar shape specimens (n=6). Data was analyzed by t-tests in Statistical Analysis Software (SAS). Results: Vita Enamic survived an average of $171,985(\pm 23,727)$ loading cycles and failed at $158.2\text{N}(\pm 18.2)$. This material averaged a survival of 5.3 steps at 15N increments and demonstrated an average maximum tensile stress of $202\text{MPa}(\pm 22.7)$. Varseosmile Crown Plus survived an average of $108,107(\pm 40,432)$ loading cycles and failed at $123.2\text{N}(\pm 34.3)$. This material averaged a survival of 3.3 steps at 15N increments and demonstrated an average maximum tensile stress of $164\text{MPa}(\pm 43.8)$. The differences in failure load ($p=.0106$), number of loading cycles ($p=.0004$), number of steps ($p=.0005$) and tensile stress ($p=.0264$) were all statistically significant between the two materials tested. Vita Enamic demonstrated an average fracture toughness of $1.343\text{MPa}\sqrt{\text{m}} (\pm 0.067)$. The minimum value was $1.274\text{MPa}\sqrt{\text{m}}$ and the maximum was $1.426\text{MPa}\sqrt{\text{m}}$. Varseosmile Crown Plus demonstrated an average fracture toughness of $0.878\text{MPa}\sqrt{\text{m}} (\pm 0.095)$. The maximum value was $1.043\text{MPa}\sqrt{\text{m}}$ and the minimum was $0.789\text{MPa}\sqrt{\text{m}}$. The difference in fracture toughness was statistically significant ($p<.0001$). Conclusion: Varseosmile Crown Plus appears to demonstrate inferior fatigue resistance and fracture toughness relative to Vita Enamic. These findings suggest Varseosmile Crown Plus may not demonstrate a long service life as a permanent restoration relative to Vita Enamic.

P35 Effect of Artificial Aging on Surface Characteristics of Dental Composites. M. ARRAGEG*, D. ALQAHTANI, E. AL KABA, S. FEITOSA ((Indiana University School of Dentistry)

Improvement of restorative materials led to the development of materials with antimicrobial activity. However, developing dental composites with antibacterial activity should be obtained while maintaining the other clinical properties. The purpose of this in vitro study was to compare the surface microhardness and surface roughness of one conventional dental composite: (FT) Filtek™ Supreme (3M oral care, MN, USA), and two ion-release dental composites: (AB) Activa Bioactive, (AP) Activa Presto (Pulpdent, Watertown, MA, USA). Disc-shaped specimens were prepared for microhardness (8x2 mm, n=5 per group) and surface roughness (6x2 mm, n=10 per group). Microhardness was determined using the Vickers hardness test (VHN) and surface roughness (Ra) was determined using contact profilometry. Both tests were performed at baseline (24 hours after specimen preparation) and after 30 days of water storage at 37°C. For data analysis, the Paired T-test and One-way ANOVA followed by the post hoc Tukey test (P -value = 0.05) were used. Regarding microhardness, there was a highly significant difference between the groups ($P=0.00000001$) with (FT) exhibited the highest VHN (mean=107.2), while (AB) had the lowest VHN (mean=27.3). All materials exhibited a significant decrease in microhardness VHN after 30 days of water aging. Regarding surface roughness, (AB) and (FT) exhibited a significant increase in surface roughness ($p=0.0215$, $p=0.000451$ respectively), and no significant effect was observed in the surface roughness of (AP) ($p=1.560$) after 30 days of water aging. The results suggest that accelerated aging had significant effects on the microhardness of all tested materials. However, accelerated aging had no significant effects on the surface roughness of Activa Presto. Activa Bioactive and Activa Presto were found to have lower values of hardness before and after aging compared to Filtek Supreme.

Research Poster Presentations MICROBIOLOGY / IMMUNOLOGY / ORAL BIOLOGY

P36 Assessment of Taste Dysfunction and Chronic Periodontitis in Long COVID-19. N.RILEY*, H.MANUKONDA, A.G. GOSSWEILER, P. PATEL, M.SRINIVASAN (Indiana University School of Dentistry)

Emerging data suggest increasing prevalence of persistent symptoms in individuals infected with severe acute respiratory syndrome coronavirus-2 (SARS-CoV2). Referred to as long coronavirus disease (COVID-19) or post-acute sequelae of COVID-19 is a multisystemic condition comprising often severe symptoms. Neurological and cognitive symptoms are a major feature of long COVID-19, including loss of (or phantom) smell or taste. The severity of COVID-19 disease is commonly observed in individuals expressing the non-taster variant of the bitter taste receptor gene, TAS2R38 (AVI homozygous). Research suggests that TAS2R38 is also implicated in immune responses. Gingival epithelial cells from non-taster TAS2R38 allele exhibit higher responses to periodontal pathogens. Together, we hypothesize that the SARS-CoV2 co-infection could aggravate pre-existing periodontal disease and/or initiate new periodontal lesions, particularly in non-tasters. We began by recruiting individuals with a history of positive CoV2 test results with self-reported symptoms of taste or smell perception. Taste and smell acuity was assessed using the Waterless Empirical Taste Test (WETT). Periodontal health was also assessed by a single experienced examiner who measured pocket depth and clinical attachment levels. The objective measures of perception of five fundamental tastes (sweet, bitter, salt, sour, and savory) were analyzed by RedJade's sensory analysis software. Our data suggests that 23% of long-COVID-19 patients failed to identify bitter taste, and almost 30% of individuals had trouble identifying at least two tastes in more than 25% of taste tests. However, 86% had a normal sense of smell and all demonstrated good periodontal health. In conclusion, data suggest that the gustatory disturbance is independent of smell dysfunction in the long-COVID-19 cohort. Chronic periodontitis is not common in long-COVID-19.

P37 Kalirin Deletion impacts Osteocyte Dendrite Length. Z. ABEDINI-SEAY*, K. CHESTER, J. MING HONG, A. BRUZZANITI (Indiana University School of Dentistry)

Background: Kalirin, a dual GTP-exchange factor protein, is expressed in osteoblasts (OB), osteoclasts (OC), and osteocytes (OT). OTs have membrane extensions, dendrites, for inter-communication between OTs, OBs, and OCs. Evidence suggests OTs are required to balance OBs and OCs, maintaining bone homeostasis. In 2014, our lab investigated the effects of Kalirin via a global knockout mouse model, resulting in a decreased bone mass phenotype in both males and females, but more exaggerated in females. Additionally, there was an increase in OCs and a decrease in OBs. This led us to investigate the potential effects of Kalirin on bone cell-specific knockouts. Methods: A Kalirin-floxed DMP1 Cre mice which lack kalirin in OTs (FFC+) and littermate control mice (FFC-) were used to investigate the effects of kalirin deletion on OT morphology in vitro (n=3 mice/genotype). Limbs from mice were flushed of bone marrow and then subjected to sequential collagenase digestion (5 steps). The remaining bone chips were plated on 6-well collagen-coated plates for 10 days, allowing the OTs to attach to the plate surface. Cells were then imaged and analyzed via ImagePro7. Results: Kalirin deficient (FFC+) groups demonstrated fewer OTs and fewer dendrites overall when compared to the controls (FFC-). However, for OTs with dendrites present, they were longer in the FFC+ samples compared to the FFC- controls. Discussion: The fewer OTs in Kalirin deficient OTs can potentially be caused by a higher rate of apoptosis compared to control mice. Alternatively, Kalirin deficient OTs may have a deficit in migration or attachment to the cell culture plates, or have different proliferation rates, compared to control OTs. Further, we speculate that an increase in OT dendrite length may be affected by cell density, which was lower in FFC+ groups compared to controls.

P38 Pyk2 Regulates Nedd4 Expression in Murine and Human Differentiated Osteoblasts. D. MARIN CADAVID*, P. MCINTYRE, M. TUDARES, K. CHESTER, J.M. HONG, A. BRUZZANITI (Indiana University School of Dentistry)

Translational dentistry utilizes stem cells to promote cell growth, differentiation, and repair of mineralized tissues. Mice with global deletion of the tyrosine kinase Pyk2 (Pyk2-KO) demonstrate bone gain through decreased osteoclast resorption and increased osteoblast activity. Moreover, Pyk2 inhibition with PF-4618433 enhanced osteoblast differentiation and activity in vitro. Our proteomic analysis revealed Pyk2 binds to neural precursor cell-expressed developmentally down-regulated protein 4 (Nedd4) in murine osteoblasts, suggesting a potential regulatory role in osteoblast function. Nedd4 is an ubiquitin ligase involved in proteasomal degradation and potentially regulates craniofacial and skeletal bone formation. Objective: Investigate the role of Nedd4 in the Pyk2 mechanism of action regulating osteoblast differentiation and activity in murine and human osteoblasts. Methods: Bone marrow stromal cells isolated from Pyk2-KO and wild-type (WT) long bones were cultured in osteogenic media (50 µg/ml ascorbic acid and 5 mM β-glycerophosphate) for 21 days. Commercial human dental pulp stem cells (hDPSC) were cultured in osteogenic media containing increasing concentrations of PF-4618433 (0, 0.1, 0.3 and 0.6 µM). Nedd4 expression was analyzed by QPCR and Western blotting. Osteoblast differentiation was determined by ALP activity assays normalized for total protein. Statistical significance was by ANOVA (p<0.05). Results: Nedd4 protein levels increased early in differentiation, with a peak at day 7, and lower in day 21 differentiated human and murine osteoblasts. Furthermore, Pyk2-KO osteoblast showed higher Nedd4 mRNA and protein levels, and an increase in ALP activity compared to WT osteoblast. Consistent with this, PF-4618433 led to a dose-dependent increase in Nedd4 mRNA as well as an increase in ALP activity in hDPSC osteoblasts. Conclusions: These findings provide a first mechanistic insight in the interaction between Pyk2 and Nedd4 in osteoblasts from murine and hDPSC and suggest an inverse association in regulating mineralized tissues in bone and the pulp-dentin complex. (Supported by Grant No. 1R01AR080076)

P39 Inhibitory Activities of Cannabidiol against *Porphyromonas gingivalis*. A. AZABI*, L.J. WINDSOR, R.L. GREGORY (Indiana University School of Dentistry)

Objectives: Periodontitis is an inflammatory disease characterized by inflammation of the soft tissue, loss of periodontal attachment, and resorption of the alveolar bone. The disease initiation and progression is modulated by both the local microbiota and host immune responses. *Porphyromonas gingivalis*, a Gram-negative anaerobe, is a periodontopathogen that exhibits many virulence factors that contribute, either directly or indirectly, to tissue destruction such as the production of proteases (gingipains Rgp and Kgp) and hemagglutinin. This study aimed to evaluate the antibacterial efficacy of cannabidiol (CBD) against *P. gingivalis* growth as well as some virulence factors. Methods: The growth of *P. gingivalis*, both planktonic and biofilm, treated with different concentrations of CBD was evaluated. The effects of CBD on the hemagglutination activity of *P. gingivalis* was evaluated. In addition, the effect of CBD on both the non-specific and specific proteolytic activities was assayed. Results: CBD concentrations $\geq 0.47 \mu\text{g/ml}$ exhibited significant inhibition ($p < 0.003$) against *P. gingivalis* biofilm growth. The minimum bactericidal concentration of CBD was $3.75 \mu\text{g/ml}$. CBD reduced hemagglutination activities at sub-MIC concentration. CBD slightly inhibited the overall proteolytic activity. Concentrations of CBD $\geq 0.63 \mu\text{g/ml}$ exhibited inhibitory effects on lysine-specific gingipain. Conclusions: These findings demonstrate that CBD has antibacterial effects against *P. gingivalis* and can inhibit some of the virulence factors related to the ability of host tissue invasion.

P40 Kalirin Deletion Negatively Impacts Alveolar Bone and Maxillary Bone Structures. K. CHESTER*, D. GODFREY, M. TUDARES, D. MARIN CADAVID, J.M. HONG, H. TURKKAHRAMAN, A. BRUZZANITI (Indiana University School of Dentistry)

Background: Osteoporosis and bone loss affect craniofacial structures, impacting the prognosis of dental treatments including implants and dentures. Osteocytes maintain the balance between osteoclast and osteoblast activity. During osteoporosis, osteocyte dysfunction increases osteoclast activity and decreases bone formation leading to low bone mass. A human *KALRN* mutation was associated with reduced bone age, including head circumference. In mice, global *Kalrn* deletion leads to decreased femoral bone mass. Objectives: To elucidate the role of Kalirin in osteocytes on the dental, alveolar and craniofacial bone phenotype of mice. Hypothesis: Kalirin deletion in osteocytes will reduce alveolar, periodontal, and craniofacial bone mass. Methods: The maxillary and mandibular structures of female and male global Kalirin (KAL-KO) mice (12 weeks) and osteocyte-targeted Kal-Dmp1-Cre mice (26 weeks) and their respective wild-type littermates ($n=10-15/\text{group}$) were investigated via micro-computed tomography. Maxillary alveolar bone was analyzed between two buccal roots of the maxillary second molar. The central region of the first mandibular molar was analyzed for total bone volume (excluding the molar and incisor). Lingual cementum-enamel to alveolar bone crest (CEJ-AC) distance was measured, representing the clinically assessed periodontal pockets. Statistical significance between Kal-KO and Kal-Dmp1-Cre and their respective littermate controls were determined by ANOVA and post-hoc tests ($p < 0.05$) Results: Kal-KO mice exhibited decreased crown volume and increased CEJ-AC distance in both males and females with no change in overall bone volume. Female Kal-Dmp1-Cre mice demonstrated decreased mandibular tissue volume (TV), with increased bone volume/tissue volume (% BV/TV), decreased trabecular thickness, and decreased trabecular spacing. Male Kal-Dmp1-Cre mice demonstrated no difference in mandibular bone. Conclusion: Kalirin deletion negatively impacts dental, alveolar, and maxillary bone structures, in part through sex-specific effects on osteocytes. This evidence suggests Kalirin plays a sexual dimorphic role in osteocytes and may affect crosstalk with other bone cell types or physiological systems that regulate bone mass.

P41 Evaluation of Antibacterial Effect of an Experimental Dental Adhesive. M. ELSHARKASI*, J.A. PLATT, F. LIPPERT (Indiana University School of Dentistry)

Objective: The longevity of resin composite restorations of up to 10 years is well documented. A common cause of composite restoration failure is secondary caries. Incorporating antimicrobial agents in dental adhesives may prevent the recurrence of carious lesions. This study aimed to develop a dental adhesive material with antibacterial activity, intending to prevent secondary caries and improve the longevity of resin composite restorations. **Materials and Methods:** The experimental adhesive was prepared by mixing Advantage Arrest silver diamine fluoride (SDF) 38% (Elevate Oral Care, FL, USA) and Optibond Solo Plus dental adhesive (Kerr, CA, USA) at a 1:9 ratio (v/v) at room temperature with a filtered lightening system to prevent unwanted polymerization. Unmodified adhesive was used as a control group. Four resin composite discs (6×1 mm) for each group were prepared. Seven μL of the experimental adhesive was pipetted on both faces of the disc and polymerized, and nail polish applied on the periphery. Similarly, this procedure was performed for the conventional adhesive. Discs were sterilized with UV light then placed in 48-well microplates containing 180 μL Tryptic Soy Broth (TSB) (Acumedia, Baltimore, Md., USA), 10 μL of bacteria inoculum (*S. mutans* UA159 strain), and 1% glucose. The plates were incubated in 10 % CO_2 at 37°C for 24 h. Discs were removed from plates, washed with saline, placed in a tube with 1 mL saline, subjected to 10 s vortex and sonication, and spiral plated onto blood agar plates. The plates were incubated for 24 h. The number of colonies forming units (CFU) for the wells was measured by automated colony counter. **Results:** There was a significant effect ($p<0.01$) of experimental adhesive on reducing CFU when compared to the control group. **Conclusion:** The incorporation of SDF to the commercially available dental adhesive prevented the formation of *S.mutans* biofilm.

P42 ZG16B, a Secretory Jacalin-Related-Lectin Protein Serves in Various Salivary Gland Pathways. D. P. MODY*^{1,2}, A.C. DA SILVA¹, R. SHARMA¹, J. NGUYEN¹, Y. WU³, A. WERNER³, M. AURE⁴, J. MAYS¹ (¹NIH NIDCR Oral Immunobiology Unit, ²Indiana University School of Dentistry, ³NIH NIDCR Division of Intramural Research Stem Cell Biochemistry Unit, ⁴NIH NIDCR Division of Intramural Research Matrix and Morphology Unit)

Objective: Zymogen granule 16B (ZG16B) is a highly expressed exocrine protein. Recent shotgun proteomic work from our laboratory identified a correlated decrease in salivary ZG16B with alloimmune salivary gland disease. However, little is known about the contribution of ZG16B to salivary gland biology and the oral microenvironment. Hence, we aim to characterize the functional role of ZG16B in human minor salivary gland (MSG) and saliva. **Methods:** Endogenous intra- and extracellular interactions of ZG16B in immortalized human salivary gland (HSG) cells were analyzed through co-immunoprecipitation and mass spectrometry. Conditional knockdown of ZG16B was optimized in these cells using mRNA oligos (AUMSilence) followed by proteomic and PCR analysis to assess the functional importance of ZG16B in HSG. In parallel, an *ex vivo* organoid model was optimized to explore *Dcpp1*, the murine ortholog to ZG16B, expression and function in major murine salivary glands. **Results:** Western blot data validated the size of ZG16B to ~20-22 kDa in HSG cells. As previously described by our group, expression of ZG16B is localized to serous acinar cells in normal MSG. Mass spectrometry data suggested ZG16B from HSG supernatant interacts with various molecules (LAMTOR5, YAP1, TRAPPC9, ect) involved in innate immunity, cell adhesion, and hippo signaling pathways. In murine tissues, *dcpp1* expression was localized in the serous acinar cells of sublingual gland. STRING consortium analysis predicted *dcpp1* protein interaction with *Bpifa2*, an antimicrobial marker. Preliminary data from murine submandibular gland organoids suggest *Dcpp1* is co-expressed with *Aqp5*, *Mist1*, *Bpifa2*, and *Krt5*. **Conclusions:** Abundant ZG16b in exocrine cells is involved in an extensive signalling network. Work is ongoing to determine its functional role and binding partners in HSG cells. In parallel, the murine organoid models expressing *Dcpp1* are a good model to further study and identify co-interactions and the role of ZG16B in salivary glands.

Research Poster Presentations *ORAL DISEASE PREVENTION AND DIAGNOSIS*

P43 TMD-7: Sensitivity and Specificity, Expediting Diagnosis and Referral. A. DRESNER*, C. LANE, H. AVILA, T. TREAT (Indiana University School of Dentistry)

Temporomandibular disorders (TMDs) describe a group of musculoskeletal conditions that may or may not involve pain and/or dysfunction in the masticatory muscles, temporomandibular joints (TMJ) and other neighboring structures. With TMDs being a progressively worsening condition, early recognition and treatment of TMDs may prevent the chronic, life impacting pain experienced by 5% of the population. Simple patient questionnaires have been developed to aid in early identification, but not one has received widespread acceptance. The objective of our study is to determine the sensitivity and specificity of four different TMD patient questionnaires: TMD-7, TMD-Pain Screener, 3Q/TMD, and TMD-29, while also comparing the time of completion of each form. This study is being completed at the Indiana University School of Dentistry Screening Clinic. Our goal is to create novel diagnostic screening tools that will amplify proper diagnosis and timely referral of patients suffering from TMD. Following a screening appointment, investigators ask eligible subjects (aged 18+) if they are willing to participate in the study. If the subject consents to participate, then they complete four paper questionnaires, while investigators record the time. Following completion of each form, a Diagnostic Criteria for TMDs Assessment is conducted by a study investigator, which will be used to determine sensitivity, specificity, positive predictive value, and negative predictive value of the TMD patient questionnaires included in this study. Of the 37 subjects recruited so far, the average age is 46 years old and the average time it takes individuals to complete each questionnaire are listed as follows: 3Q/TMD: 17 seconds, TMD-7: 36 seconds, TMD-Pain Screener: 44 seconds, and TMD-29: 3 minutes and 2 seconds. Three of these four screening tools take less than one minute on average for subjects to complete. Additional subjects are needed to determine the sensitivity and specificity of each form in identifying Temporomandibular Disorders.

Research Poster Presentations *ORTHODONTICS / IMAGING / CRANIOFACIAL*

P44 A Novel Dental Pin Anchorage in an Orthodontic Rodent Model. J. BUSSARD*¹, J. GUSSERT¹, A. AKBARI², D. SIMEONOV², G. STRICKLAND², S. YADAV³, H. TURKKAHRAMAN¹, J. CHEN² (¹Indiana University School of Dentistry, ²Indiana University Purdue University Indianapolis, ³University of Nebraska Medical Center College of Dentistry)

Objective: The aim of this pilot study was to create a method to minimize continuous eruption of rats' incisors. We hypothesized that a horizontal pin surgically inserted completely through one root, the adjacent alveolar bone and partially inserted into the mesial side of the left maxillary incisor root would minimize maxillary incisor eruption. Materials and Methods: Two female and two male Wistar rats of 16 weeks of age were used. The rats were sedated with isoflurane and anesthetized with a Ketamine/Xylazine cocktail. A vertical incision was made to raise a full thickness periosteal flap exposing the incisor roots and surrounding alveolar bone. After tissue reflection, a pilot hole of 0.65mm diameter was drilled through the right maxillary incisor root, surrounding alveolar bone and touching the mesial side of the left maxillary incisor root. A self-threading dental pin (Whaledent, Mahwah, NJ) of 0.027" diameter and 5mm length was inserted into the distal side of the right maxillary incisor root, surrounding alveolar bone and contacting the mesial side of the left maxillary incisor root. Microcomputed tomography (μ CT) scans were used to visualize the pin position and its relative position with the alveolar bone for quantifying tooth eruption at a 28-day interval. Results: μ CT scans revealed that the pin was still engaged with the right incisor, through the alveolar bone and partially inserted into the mesial side of the left maxillary root, thus the added constraint was primarily on the right incisor. The images demonstrated that the right maxillary incisor remained in a similar location with respect to the surrounding alveolar bone. The left incisor had no visible eruption with respect to the right incisor. Conclusion: The maxillary incisors experienced minimal to no incisor eruption. Therefore, this method provides stable anchorage for an orthodontic force in rats.

P45 Improving Anchorage: Implant Pin Retention in the Orthodontic Rat Model. J. GUSSERT*¹, J. BUSSARD¹, A. AKBARI², D. SIMEONOV², G. STRICKLAND², S. YADAV³, H. TURKKAHRAMAN¹, J. CHEN² (¹Indiana University School of Dentistry, ²Indiana University Purdue University Indianapolis, ³University of Nebraska Medical Center College of Dentistry)

Objectives: The orthodontic rat model relies on the incisors as anchorage for the application of an orthodontic force on the first molar. One opportunity in the model is to improve the consistency of the incisal anchorage, as unrestrained rat incisors have been observed to erupt 0.4 mm per day. Our lab has tested a new model where a dental pin is inserted through the roots of the incisors and supporting bone to inhibit eruption. The aims of this study are to 1) show the successful inhibition of incisor eruption and 2) propose a mechanism of action. **Methods:** This prospective in-vivo animal study was completed by surgically inserting a gold-plated stainless steel dental pin, diameter 0.7 mm, in eight 15-week-old Wistar rats. Prior to surgery, the rats were sedated, and grooves marked at the marginal gingiva. 2-3mm below the crest of the alveolar bone, the pilot hole was drilled to a final diameter of 0.75mm, which facilitated a passive insertion of the dental pin. An initial μ -CT image was recorded. After ten days, a periodontal probe was used to measure the new position of the incisal reference grooves relative to the marginal gingiva and a second μ -CT image was recorded. After 28 days, the rats were sacrificed and the peak pulling force immediately before the dental pin's release was measured using a transducer. **Results:** Mean incisor eruption of 0.43 mm per day was observed in the control group and no eruption was observed in the rats with dental pins inserted. The retentive strength of the dental pin was found to be 485 grams. The pin's resistance to rotation was undetectable. No tissue, mineralized or otherwise, was observed adhered to the pin's surface. **Conclusion:** The dental pin inhibited incisor eruption. The mechanism is thought to be mechanical and not osseointegrative.

P46 Diagnosis, Treatment, and Referral Patterns of Children with Condylar Abnormalities. J.L. SNIDER*¹, K.T. STEWART¹, N.S. MATTHEWS¹, S.R. BALLINGER², R.S. CONLEY¹ (¹Indiana University School of Dentistry, ²Indiana University School of Medicine)

Objectives: Condylar abnormalities can impact patient function and facial aesthetics in growing children. This study aims to explore the diagnosis, treatment, and referral practices of orthodontists in Indiana concerning pediatric condylar abnormalities, to understand the current patient care pathways. **Experimental Methods:** A survey was distributed to all 145 active and life members of the Indiana Association of Orthodontics to assess their experiences with pediatric patients (<18 years old) presenting with condylar abnormalities. The survey included questions about diagnosis, management, referral patterns, practitioner demographics, and professional education. **Results:** A total of 43 responses were received; 38 respondents, reported encountering one or more pediatric patients with condylar abnormalities in the last 5 years while 5 did not. Among the 38 patients who encountered one or more condylar abnormality patients, 35 completed the full survey. Respondents were predominantly male, aged 55 or greater, and primarily in suburban practices. Most respondents encountered 10 or fewer pediatric condylar abnormality cases in the past 5 years demonstrating the relative rarity of these conditions. The most frequent tools used for diagnosis were radiographs and clinical examination. Case complexity and patient age were the largest factor in the respondents' decision to treat or refer. The primary referral recipients were oral and maxillofacial surgeons (OMS) and temporomandibular joint (TMJ) specialists. A notable percentage of orthodontists reported they lacked formal training in diagnosing and managing condylar abnormalities. **Conclusion:** The study provides insights into the current diagnosis and management patterns of pediatric condylar abnormalities among Indiana orthodontists. The results underscore the need for targeted interventions in formal and continuing education for practitioners to address gaps in training and ensure optimal care for affected patients. Further research and educational initiatives are warranted to enhance the understanding and management of this complex condition within the orthodontic community. (Supported by IUSD Student Research Fellowship)

Research Poster Presentations *PEDIATRIC DENTISTRY*

P47 Provider Acceptance and Utilization of the Hall Crown Technique. N. CARLSON*, B. SANDERS, L. VINSON, J. DEAN (Indiana University School of Dentistry and Riley Hospital for Children)

Purpose: Stainless steel crowns (SSC) are widely utilized in restoring carious primary teeth. The conventional SSC preparation is most performed, but in recent years the emergence of the Hall technique (HT) has provided an alternative restorative technique in pediatric dentistry. The Hall Technique requires little to no preparation of tooth structure and no caries excavation, which in turn would seem desirable for providing treatment to the pre-cooperative child. The purpose of this project is to examine the provider acceptance and clinical usage of the Hall Technique among active members of the American Academy of Pediatric Dentistry (AAPD). Experimental Methods: The data will be collected utilizing a survey, consisting of several questions, distributed to all members of the AAPD. Chi-square test for categorical variables and t-test for continuous variables will be used to test for the differences among pediatric dentists regarding the environment, scenario, treatment method, and acceptance of HT. The subsequent data and results will be analyzed and represented appropriately to gain insight on the views of HT and its clinical use. Initial Results: 51% of pediatric dental specialists consider HT as an alternative treatment option when unable to place a conventional restoration. 66% of clinicians are more inclined or neutral to utilize the HT when patient behavior is poor, and they are reluctant to treatment. Conclusion: The results of this study demonstrate that most pediatric dentists prefer to place a conventional restoration rather than the HT. There is an increased likelihood among providers to plan for the HT when the patient demonstrates poor behavior and is reluctant to treatment.

P48 Trends in Prefabricated Zirconia Crown Usage: A Dental Claims Review. S. COOPER*, A.C. SCULLY, J.F. YEPES, T. DOWNEY, G. ECKERT, G. MAUPOME (Indiana University School of Dentistry and Riley Hospital for Children)

Purpose: The purpose of this project is to investigate how prefabricated zirconia crowns (PZC) are being used in the United States. Methods: Proportional usage of PZC in primary teeth were compared to other full coverage options. Other variables investigated include: dental specialty, location in the mouth, geographic location and concurrent pulpal therapy. The financial cost of placing prefabricated zirconia crowns vs other options was also investigated. The data for this study was obtained in conjunction with Fluent, a private dental insurance claims database, through a partnership agreement with Indiana University. A retrospective analysis of dental claims made from January 1st, 2013 to December 31st, 2022 was completed. Data was extracted using Common Dental Terminology codes, with associated data including date, tooth number, cost, patient information and dental provider information. CDT codes included PZC (D2929), Stainless Steel Crowns (SSCs) (D2930), resin window SSCs (D2933), pre-veneered SSCs (D2934), resin-based composite crowns (D2390), pulpotomy (D3220) and pulpectomy (D3221). Data was analyzed using Chi-square analysis and multinomial logistic regression. Results: Preliminary results found 6.4 million claims for children 0-18 years in which full coverage restorations were placed. 74,000 pulpotomy/pulpectomy claims were found to correlate to those 6.4 million full coverage claims. Indicating that only about 1% of the time a pulpal therapy is completed prior to full coverage restoration placement. Conclusions: Preliminary results of this study show that pulpal therapy was not routinely associated with full coverage restorations. Further analysis will determine trends in the use of full coverage restorations on primary teeth, including new materials such as prefabricated zirconia crowns restorations.

P49 Lead Shielding Effect on Scatter Radiation from Dental Radiographs. L. KNIPPENBERG*, J.F. YEPES, J. JONES, B. SANDERS, L. VINSON, P. WONG, B. JOHNSON, G. ECKERT (Indiana School of Dentistry)

Introduction: The use of lead shielding to protect the patient from ionizing radiation has been the standard of care in modern medicine. However, this assumes that the lead is providing a protective effect. The most recent research into medical radiology has found negligible benefit in terms of reduction of absorbed radiation in adult phantom models. Additionally, there is a risk of increased radiation due to the potential that the lead will create an artifact in the image and necessitate reimaging the patient. When lead shielding is used improperly it may interfere with imaging software, resulting in repeat or increased dosage due to Automatic Exposure Control (AEC). Objective: The aim of this study is to quantify the dose of scatter radiation at the

level of the thyroid, chest, abdomen, and gonads with and without protective lead analogous shielding (thyroid collar/vest). Design: We used a pediatric phantom modeling the anatomy of a 10-year-old child. A series of dosimeters was placed at the level of the thyroid, chest, abdomen, and gonads. The Planmeca Intra X-ray unit was used to expose the dosimeters with and without a lead vest and lead thyroid collar. Hypothesis: The dosimeters will not register a statistically significant reduction in radiation exposure to the phantom at the thyroid, chest, abdomen, and gonads in the presence of lead shielding. Conclusion: The results show the use of lead shielding provides no statistically significant reduction in radiation dosage.

P50 Trends in Postoperative Pain Management by Pediatric Dentists. M. MCFRAZIER*, L. VINSON, B. SANDERS, J. DEAN (Indiana University School of Dentistry and Riley Hospital for Children)

Purpose: Pain assessment and management are essential components to ensuring optimal care for pediatric patients. It may be difficult to recognize and treat pain because children can differ in their emotional and mental development. The consequence of improper pain management can lead to significant negative psychological and physical experiences that can follow these children through development. The purpose of this study is to evaluate current trends in post-operative pain management provided by pediatric dentists by comparing results to data from Murphy et al. (2006). Data indicated that although pediatric dentists recommended OTC ibuprofen and Acetaminophen as the analgesic of choice for post-operative pain management, a significant number of pediatric dentists were prescribing opioids. This study will describe any changes in the clinician's philosophy when assessing pain management as compared to data from Murphy et al (2006). Methods: An online Qualtrics survey was sent via email to all pediatric dentists who are members of the American Academy of Pediatric Dentistry (AAPD). Email addresses of pediatric dentists were obtained from the AAPD Directory. The email contained a link to the survey. The survey questions will address which analgesics are recommended by pediatric dentists if any. The survey will inquire if analgesic recommendations differ based off treatment provided. Mantel-Haenszel and chi squared tests will be used to analyze results. Results: Results from this study show that Ibuprofen and Acetaminophen are still the first choice for OTC analgesics recommended by pediatric dentists to address post-operative pain. However, there was a significant reduction in the number of pediatric dentists who are prescribing opioids to pediatric patients to treat post-operative pain. Conclusions: The results of this study will help to determine if pediatric dentists' philosophies are more aligned with AAPD guidelines or if practitioners' prescribing habits are changing with more years of practice.

P51 Comparing Noise Production of Pediatric Dental Instrumentation Techniques. E. MECHAS*, T. HSU, C. DISCOLO, K. PHASUK, A. YEPES, A. SCULLY (Indiana University School of Dentistry and Riley Hospital for Children)

Background: Unwanted sound, also known as noise, generated during dental procedures has become an increasing concern within the dental profession. The National Institute for Occupational Safety and Health (NIOSH) has identified noise as one of the 10 leading causes of work-related diseases or injuries. Noise in the dental setting has short- and long-term detrimental effects. The purpose of this study was to compare the noise generated by different instruments used in pediatric dentistry: type of handpiece (high-speed air driven and an electric), and type of isolation system (rubber dam with a high-volume evacuation and Dryshield system). Experimental methods: Data was collected using a sound level meter (SLM) to analyze background sound and a noise dosimeter to measure individual sound exposure. The data was collected while preparing human molars for stainless-steel crowns using a high-speed handpiece and isolation/evacuation for 5 minutes. The effects of the type of handpiece (air, electric) and isolation (rubber dam with high-speed evacuation, Dryshield) on noise level was analyzed using two-way ANOVA. Essential results: SLM data showed the air driven handpiece with Dryshield was statistically the loudest, generating an equivalent continuous sound pressure level (LA_{eq}) of 80.7 (dBA) ($P < 0.001$). The dosimeter data showed that both the air

driven handpiece with Dryshield and the electric handpiece with Dryshield were statistically the loudest, LA_{eq} of 84.9 (dBA) and 86 (dBA) respectively ($P < 0.001$ and $P < 0.001$). There were no differences in peak sound levels between any of the groups ($P > 0.05$). Conclusion: None of the pediatric dental instrument combinations studied reached the LA_{eq} = 90 dBA limitation for 8 hours set by the department of Occupational Safety and Health Administration Standards. Although the noise levels were not above regulatory recommendations to prevent long term hearing loss, practitioners should still consider hearing protection based on individual exposure.

P52 Silver Diamine Fluoride Use during SARS-CoV-2 Pandemic for Non-Aerosol-Generating Procedures. D.J. NESTY*¹, A.C. SCULLY¹, J.F. YEPES¹, J.E. JONES¹, T. DOWNEY², G. ECKERT², G. MAUPOME² (Indiana University School of Dentistry and Riley Hospital for Children, ²Fairbanks School of Public Health)

Purpose: The purpose of this study is to examine the proportional use of SDF pre-Covid (2019), during the Covid shutdown (March 2020-late April 2020), early recovery (mid-May 2020 to August 2020), late recovery period (September 2020-December 2020), and continuing recovery (2021-2023) of the SARS-CoV-2 pandemic due to recommendations for non-aerosol-generating procedures. Methods: Data in this study was obtained through Fluent Dental Solutions, a national dental data warehouse. CDT Codes for Interim Caries Arresting Medicament (D1354), Limited Re-evaluation (D0170), and Operative Codes (D2000-2999) were assessed. Other variables included treatment dates, and patient and dentist information. A retrospective analysis of dental claims made over a five-year period was completed, and data points were used to determine the first treatment rendered. Analyses were conducted using generalized linear mixed models and a two-sided 5% significance level was used for all tests. Results: There was a significant increase in proportional use of SDF in each of the Covid periods as compared to pre-Covid SDF use ($P < .001$) with a general trend of increasing proportional usage over time. This trend was true regardless of specialty, although pediatric dentists used proportionally more SDF than general dentists throughout ($P < .001$). During continuing recovery, posterior teeth were more likely to have SDF applied than anterior teeth ($P < .001$). However, this was not seen in the Covid shutdown, early, or late recovery periods ($P > .05$). Conclusion: Quantitatively, SDF usage proportionally increased during each of the Covid periods as compared to pre-Covid SDF use, suggesting a shift toward non-aerosol-generating procedures. This could guide decision making for operative treatment and use of SDF as an alternative treatment option in situations when traditional aerosol-generating procedures are not preferred.

Research Poster Presentations *PRACTICE MANAGEMENT*

P53 Interprofessional Care for TMD: Psychosocial, Pain, and Functional Treatment Outcomes. N. NOVOSEL*, M. DI GIOSIA, N.S. MATTHEWS (Indiana University School of Dentistry)

Temporomandibular disorders (TMD) affect the temporomandibular joints (TMJ), masticatory muscles, and associated tissues which can present concurrently with poor psychosocial wellbeing, orofacial pain, and functional limitations that may affect quality of life. The Indiana University School of Dentistry TMJ Institute, established in October 2021, is a multidisciplinary clinic designed to support the management of patients with challenging TMD. Professionals from dentistry, medicine, physical therapy, and social work collaborate to create a customized, interprofessional consensus to patient care. For patients with a generic diagnosis of TMD, are psychosocial wellbeing, orofacial pain and jaw function improved when managed with an interprofessional approach? The objective of this study is to identify the state of anxiety, depression, orofacial pain, and jaw function in relation to quality of life in new patients triaged to the TMJ Institute and determine the degree of change between these parameters at initial and follow-up appointments. Between October 2022-January 2024, new patients received the validated Hospital Anxiety and Depression Scale, Graded Chronic Pain Scale and Jaw Functional Limitation Scale surveys at their initial and follow-up appointments (~4 months apart). 33 patients completed initial surveys, and 7 patients completed follow-up surveys. Changes in scales between parameters at initial and follow-up appointments for the 7 patients were summarized and tested for statistical significance using paired t-tests with two-sided 5% significance levels.

The results reveal that there was a statistically significant decrease in orofacial pain (P=0.016) and jaw function limitation (P=0.023) and no significant change in anxiety and depression following an interprofessional treatment plan. The results of our study address the importance of screening for psychosocial wellbeing, orofacial pain and functional parameters to properly assess and manage the complex clinical profile of TMD patients; furthermore, supporting the efficacy of an interprofessional treatment approach for this patient population.

Research Poster Presentations *PROFESSIONAL DEVELOPMENT*

P54 Read to Lead: Fostering a Humanistic Environment through Book Clubs. L. LEVENDOSKI*, K.T. STEWART, L. LANG

Dental academia, at times, can be a siloed and disconnected environment. Daily responsibilities are often confined to one's department, with little time to initiate opportunities for development or progressive dialogue. It is imperative to foster a humanistic environment where bridges of collaboration are built across departments and between academic and professional roles while enhancing opportunities for stakeholders to learn and grow together. To promote such an environment, we created and implemented an internal professional development book club, the Read to Lead series. The goals of this series include 1) building relationships across departments, 2) encouraging innovative ideas, and 3) enhancing our institution's culture to better support all present stakeholders. Methods: A preliminary survey was sent to all faculty and staff to determine level of interest. To ensure productive discourse, discussion groups were kept to 10 participants each (n=30). Three groups participated one day a week, over the lunch hour once a month, from September to June. The groups included a diverse mixture of faculty and staff from various departments and administrative offices. Participants remained in the same groups throughout the series to establish group trust and a safe space to challenge ideas. Only 2-3 chapters were discussed at a time to facilitate more profound discussions. Outcomes: Through participation in this inaugural session, 77% of participants accomplished their initial goal of developing new insights and networking, 38% of participants noted improvement in their leadership skills, and 69% of participants were encouraged to sign up for our next Read to Lead series. Conclusion: The Read to Lead series helped to remove invisible barriers to collaboration, supported the expansion of new ideas and individual leadership initiatives, and fostered the development of relationships that better support a more humanistic environment within our institution.

Research Poster Presentations *PROSTHODONTICS*

P55 Accuracy of Digital Segmentation Protocols from Cone Beam Computed Tomography. A. HERNANDEZ*, W.S. LIN, C.C. YANG, V. DUTRA, T.M. CHU (Indiana University School of Dentistry)

Statement of Problem: Segmentation is part of the digital workflow that is key in both diagnosis and fabrication of 3D models and guides. Conventional segmentations require extensive manual processing and can be inconsistent due to noise and artifacts resulting in a growing demand for AI-based segmentation. Aim: assess the potential of AI-based segmentations by comparing its accuracy to that of global thresholding and manual segmentation. Materials and methods: Twelve dry mandibles were used in this IRB-exempt study (IRB.19615). All mandibles were scanned using cone beam computed tomography (CBCT) scanner with a field of view measuring 100x140mm and 0.15 voxels. CBCT scans of these mandibles were segmented using three protocols: global thresholding, manual segmentation, and AI-based segmentation. A structured light scanner created reference models for each mandible and were compared to those from the segmentation protocols using a point-based registration system with fine and global alignment. Deviation magnitude was quantified by recording root mean square values. ANOVA ($\alpha = 0.05$) analyzed differences in deviations and linear measurements among the segmentation methods, incorporating a random mandible effect to correlate the three methods' measurements on the same specimen. Results: Global thresholding shows higher RMS values in all areas compared to both manual and AI-based segmentations. AI-based segmentations had

significantly higher RMS values than manual segmentations for the entire mandible, alveolar process, and body of the mandible and significantly lower RMS values in the condyle and ramus. Conclusion: AI-based segmentation demonstrated lower RMS values in comparison to global thresholding, suggesting it as a more accurate alternative for certain mandibular areas. While AI-based segmentation did not show significant differences in RMS values compared to manual segmentation in some regions, it generally presents a viable and potentially less labor-intensive segmentation method suitable for clinical application.

P56 Effects of Anodization/Instrumentation on Surface Characteristics and Biofilm Formation. W. LIU*¹, R.L. GREGORY¹, Y. HAMADA², C.C. YANG¹, W.S. LIN¹ (¹Indiana University School of Dentistry, (²University of California Los Angeles School of Dentistry)

Objective: To assess the impact of anodization and instrumentation on titanium abutment surface characteristics and biofilm formation. Materials and Methods: Polished titanium-6aluminum-7niobium disc samples were divided into untreated, gold-anodized, and pink-anodized. Instrumentation methods included no instrument, air polishing, and titanium curette. Surface roughness was assessed using an optical profilometer, and wettability was determined by measuring contact angles with an optical tensiometer. Biofilm formation by *Streptococcus sanguinis* was evaluated through colony forming unit (CFU) counting. Two-way ANOVA was performed to determine the group differences, and Spearman correlation (ρ) was used to analyze the correlation among surface roughness, wettability, and CFU. ($\alpha = .05$) Results: Pink anodization significantly increased surface roughness ($0.38 \pm 0.07 \mu\text{m}$, $p < .001$) compared to untreated samples ($0.25 \pm 0.01 \mu\text{m}$), while gold anodization did not ($0.24 \pm 0.03 \mu\text{m}$, $p = 0.301$). Among pink-anodized groups, air polishing resulted in significantly lower surface roughness ($0.33 \pm 0.08 \mu\text{m}$) compared to no-instrument ($0.38 \pm 0.07 \mu\text{m}$, $p = .050$). Anodization significantly increased wettability ($p < .001$), while instrumentation with titanium curette decreased it ($p < .001$). Biofilm formation, measured by CFU/mL, was significantly inhibited by anodization ($p < .001$) and air polishing ($p < .001$), while promoted by titanium curetting ($p < .001$). Gold-anodized titanium discs subjected to air polishing exhibited the lowest CFU/mL (279.42 ± 16.30), while untreated samples instrumented with titanium curette had the highest CFU/mL (945.58 ± 13.58). A moderate negative correlation was observed between CFU and wettability ($\rho = -0.55$, $p < .001$). Conclusion: Anodization of Ti-6Al-7Nb abutments, enhances hydrophilicity and reduces biofilm formation, could be employed as a prophylaxis to prevent biofilm. Air polishing with erythritol-chlorhexidine powder inhibits biofilm formation and is preferable to titanium curettes, which may promote it. When Ti-6Al-7Nb is selected for the implant abutment, gold-anodization with air polishing is the best practice for peri-implant health maintenance. (Grant ACP Education Foundation Research Fellowships 2022)

Research Poster Presentations **PUBLIC HEALTH**

P57 Association of Periodontal Disease and Inequities with Long Haul COVID-19. S. ALHAFFAR*, S. YALAMANCHI, A. SHUKLA. (Indiana University School of Dentistry)

In 2000, the Surgeon General's report highlighted that the mouth is a mirror for overall health of an individual and that disparities in oral health are directly proportionate to general health inequities. Among patients hospitalized due to COVID-19, diabetes, and cardiovascular disease are the most common comorbidities; several studies support the association of these conditions with periodontal disease. This study's main aim is to assess the disproportionate impact of the COVID-19 pandemic on populations from lower socioeconomic statuses. The study also aims to assess the association of self-reported periodontal disease with COVID-19 disease course and severity. A sample population of Indiana residents with positive diagnosis of SARS-CoV-2 were recruited. A validated survey tool was sent to this cohort inquiring about sociodemographic distribution; co-morbid conditions, current symptoms of "long haul COVID," course of their COVID-19 infection; history of periodontal disease, existing periodontal disease symptoms, and oral hygiene habits. A total of 276 individuals with history of positive COVID test were returned to the survey, and associations of participant characteristics and periodontal disease-related survey items with COVID-related survey items were evaluated using chi-square tests. Lowered sense of taste was associated with older age, worse health, more frequent bleeding

gums, more frequent mobile/loose teeth, potential gum disease, more frequent toothaches, worse oral health, and history of teeth lost due to gum disease. Lowered sense of smell was associated with less education, being unemployed/disabled, worse health status, more frequent bleeding gums, more frequent toothaches, and lower oral health rating. History of hospitalization due to COVID-19 was associated with more frequent dental floss use and more frequent mouth rinsing. History of hospitalization due to COVID-19 was also associated with history of gum disease within the past 12 months.

P58 Mapping of Dental Public Health Education at IUSD. B. GEHLHAUSEN*, E.A. MARTINEZ-MIER, A. SHUKLA (Indiana University School of Dentistry)

Competency-based education is a trusted approach to evaluate students' performance and learning outcomes, specifically in dentistry. This study will analyze how the Dental Public Health curriculum at Indiana University School of Dentistry (IUSD) adheres to the core dental public health competencies. To assess this question, a syllabi review was conducted to identify if IUSD complies with the American Association of Public Health Dentistry (AAPHD)'s Dental Public Health competencies. This was accomplished by creating an excel document that listed all 121 courses at IUSD. Before starting the review, all researchers completed a training case to agree on the method of syllabi review. Each syllabus was reviewed by two individuals using guiding questions to decide if the course would be included in the survey. Eighteen courses were selected to be included in the survey, which included questions on learning objective and assessments in the course. The survey was sent to the faculty for all eighteen courses, which had a response rate of about 70%. A focus group was then completed with the same faculty members to obtain further qualitative data. Our next step includes the formulation of curricular recommendations. After obtaining the final results, this study aims to map the Dental Public Health curriculum at IUSD, propose curricular changes in support of these competencies, and bridge the gap between competencies and clinical practice through the development of entrustable professional activities (EPAs).

P59 Dietary Quality of Complete Denture Wearers Using Healthy Eating Index. G.F. GOMEZ*¹, H. XU², N. GLETSU-MILLER³, L.A. SPENCE³, P. PATEL¹, V. BUALTENG¹, B. CHERIYAN¹, M. WANG¹, D.O. CLARK², T.P. THYVALIKAKATH¹ (¹Indiana University School of Dentistry, ²Indiana University School of Medicine, ³Indiana University Bloomington School of Public Health)

Objective: This observational clinical study aimed to measure the diet quality of older complete denture wearers using the Healthy Eating Index (HEI) developed by the United States Department of Agriculture. Methods: We enrolled study participants aged ≥ 50 years with upper and/or lower complete denture/s. They completed two non-consecutive 24-hour dietary recalls, the first at the clinical study visit and the second within 7 days via phone using the Automated-Self-Administered (ASA24®) 24-hour web-based platform. HEI is a composite score of diet quality based on 13 food components, 9 that are encouraged and 4 are discouraged. HEI scores (0 to 100) for each study participant were computed and classified as 1) < 51 , indicating poor diet quality; 2) between 51 and 80, indicating a diet that needs improvement; and 3) above 81, indicating good quality diet. Descriptive statistics included participant characteristics, their nutrient intakes, and diet quality. Results: A total of 93 participants completed the study. About 92% of the participants received dentures after the age of 50 years, 57% were females, 50% were African Americans, 54% wore both dentures and 51% wore dentures for > 10 years. The average HEI score was 54 (sd=11.9), with poor dietary quality found in 41% of participants and diet improvement needed for the remaining 59% of study participants. Out of the 9 components that are encouraged, participants scored below recommendations per the Dietary Guidelines for Americans in total fruits, whole grains, fatty acids, greens, and beans. Among the 4 components that are discouraged, participants had low compliance with recommendations to avoid high intake of saturated fats and sodium. Intake of fiber, magnesium, vitamin E, vitamin D, and choline were lower than the dietary reference intakes for more than 90% of participants. To conclude, dietary quality of denture wearers need improvement similar to an average American for some nutrients. (Funding: Delta Dental Foundation Inc.)

P60 How Do Elderly Denture Wearers Prepare Foods for Easy Chewing? T.R. GUDISA*¹, K.K. BURLAKUNTA¹, L.A. SAWYER^{2,3}, G.F. GOMEZ^{2,4} (¹Indiana University Luddy School of Informatics Computing and Engineering, ²Indiana University School of Dentistry, ³Upsate Medical University, ⁴Regenstrief Institute Inc.)

Maintaining healthy nutrition among denture wearers is an ongoing challenge. There are dietary guidelines proposed every 5 years by the United States Department of Health and Human Services, but there are no specific recommendations for denture wearers. We aimed to conduct a rapid literature review on the cooking and food preparation skills of elderly denture wearers. This will help us to understand their eating behaviors, the challenges they face, and the strategies they use to overcome them. So, we initiated our comprehensive literature search in the PubMed database on peer-reviewed articles related to cooking skills among the elderly. Adding denture wearers as a search term in the query with cooking skills among the elderly had no articles. We then finalized 22 full-text articles that were relevant to dietary habits and their cooking and food preparation skills to promote healthy eating. We found these key findings. Although older individuals had higher confidence in cooking and food skills, their diet quality was more influenced by cooking skills than by confidence. Further, cooking skills were related to healthy dietary behaviors among both men and women. Also, cooking frequently at home, self-perceived cooking skills, social engagement were positively related to food-related quality of life. Studies also showed effectiveness on improving food quality with cooking interventions or hands-on cooking classes. Learning to cook at an early age has been shown to have better health outcomes. Even with studies showing that women tend to cook often, and cooking skills are mostly learnt at home from mothers, this skill is now less translated because of lack of culinary skills. In summary, developing cooking skills among older adults is important for dietary behaviors. Studies understanding the current cooking and food preparation skills among denture wearers and their coping strategies are required to develop eating recommendations for denture wearers.

P61 Screening Denture Wearers' Risk of Malnutrition Using Three Screening Tools. M. UDOMSINROJ*, J. BRISCOE, P. JYESTA, G.F. GOMEZ, G. ECKERT, W.S. LIN, C.C. YANG, T.P. THYVALIKAKATH (Indiana University School of Dentistry)

Introduction: Lack of natural teeth with and without dental prosthesis poses a risk for malnutrition and affects quality of life. If not detected at an early stage, it could result in the rapid deterioration of both systemic and oral health. Objective: The purpose of this study is to assess nutritional risk in complete denture wearers by using three Malnutrition Screening (MS) tools in dental clinical settings. Method: This is a cross-sectional survey study among complete denture wearers who receive care at the Indiana University School of Dentistry. Height and weight measurements were recorded, and their Body mass index (BMI) was calculated. For screening nutritional risk, the Nutrition Screening Initiative (NSI) has 10 checklists, the Mini Nutritional Assessment-Short Form (MNA-SF) with 6 questions, and the Malnutrition Screening tool (MST) includes 2 questions were used to record participant responses. Summary statistics were calculated for patient characteristics and nutrition assessments. Crosstabs, kappa, weighted kappa statistics, and percent agreement were calculated to assess the agreement among the three nutrition assessments. Results: The average age was 64 ± 15.7 years. The mean BMI of our study participants was 32.1. They had received their dentures at the age of 50. Females constituted 56% and 69% were wearing upper complete dentures. Half of the study participants scored higher for increased nutritional risk through NSI. Based on the crosstabs and agreement statistics, NSI measures nutrition differently or measures different aspects of nutrition than MNA and MST, with NSI indicating higher nutrition risk in this limited study group than the MNA and MST. Agreement between MNA and MST would also not be considered strong. Conclusion: The results suggest that the three MS screening tools differ in capturing nutritional risk among denture wearers. The sample size will be increased to improve the generalizability and quality of the data.

Research Poster Presentations *TISSUE REGENERATION AND REPAIR*

P62 Accelerated Differentiation of Osteoclasts Treated with Agents A246 and A800. R. WOLFGANG*, J. M. HONG, A. BRUZZANITI (Indiana University School of Dentistry)

Autosomal Dominant Osteopetrosis type II (ADO2) is a bone disease that causes impaired osteoclastic bone resorption, typically arising from heterozygous missense mutations in the chloride channel 7 (CLCN7) gene. To explore potential therapeutic interventions for ADO2, we employed a mouse model harboring a knock-in mutation (p.G213R) in the *Clcn7* gene. Heterozygous mice mirror the human ADO2 bone effects. Objective: Given our previous findings that inhibitors of lysosome function promote ADO2 osteoclast activity in vitro, we evaluated two newly developed proprietary pharmacological agents, which are known to alter endosomal-lysosomal trafficking in other cells, referred to as A246 and A800, on the survival and differentiation of healthy osteoclasts from C57BL/6 (wild-type) mice. Hypothesis: A246 and A800 will increase osteoclastogenesis. Bone marrow from the mice was pooled, cultured in α -MEM with 10% FBS, M-CSF, and RANKL to induce osteoclast differentiation. After 6 days, cells were fixed with formaldehyde, stained for tartrate-resistant acid phosphatase (TRAP). Osteoclasts were identified microscopically as TRAP-positive cells with more than three nuclei. Preliminary data indicates an increase in TRAP-positive osteoclasts following treatment with A246 and A800. This data suggests potential effects on osteoclast differentiation warranting further investigation in ADO2 osteoclasts.

P63 Intramuscular Administration of Adipose Stem Cell-Derived Secretome in ALS. Z. ESTAKI*, C. WALKER, C. MUMAW (Indiana University School of Dentistry)

Objective: Amyotrophic lateral sclerosis (ALS) is a devastating motor neuron (MN) disease with no cure. The involvement of numerous cellular and physiological processes and the complexity of the disease are significant obstacles to developing effective therapies. Thus, a multifactorial approach like stem cell-based therapeutics is likely to be the most appropriate as it can target multiple mechanisms simultaneously. Adipose-derived stem cells (ASCs) are multipotent mesenchymal stem cells that can be obtained easily from adipose tissue. Stem cell secretomes contain various beneficial trophic factors and cytokines. Previous data has shown the therapeutic benefits of the systemic ASC secretome in ALS mouse model. In the present study, we hypothesized that local intramuscular (IM) administration of hydrogel containing ASC secretome at late pre-symptomatic stages (PD63) of disease would improve neuromuscular junction (NMJ) innervation. Method: Sixteen mSOD1G93A mice (8 female, 8 male) received IM injection in right gastrocnemius muscle with either hydrogel containing ASC-secretome (hydrogel-ASC group) or hydrogel containing normal saline (hydrogel-saline group) at 9 weeks of age. After 3 weeks, mice were sacrificed, right and left gastrocnemius were harvested, weighed, and prepared for NMJ innervation analysis. Results: Our results showed no significant difference between the two groups regarding wet weight of muscle in both males and females. Hydrogel containing ASC-secretome increased number of innervated NMJ in both females and males, but the difference was not significant compared to hydrogel-saline group ($p>0.05$). Conclusion: Gradual release of ASC-secretome from hydrogel into the muscle has a positive although non-significant effect on NMJ innervation. Further studies are needed to investigate these effects along with other inflammatory and molecular changes within the muscle.

P64 Pyk2 Deletion in Osteoclasts Does Not Prevent Alveolar Bone Loss. M. TUDARES¹, J.M. HONG², M. KITAKA³, A. BRUZZANITI¹ (¹Indiana University School of Dentistry, ²Indiana University School of Health & Human Sciences, ³Augusta University)

Periodontitis is a chronic inflammatory response of teeth-supporting tissues. If untreated, tooth loss occurs. In mice, the ligature-induced periodontitis (LIP) method recreates periodontitis when tying a silk ligature around the second maxillary molar, leading to alveolar bone loss. Osteoclasts (OCs) are cells responsible for bone loss in periodontitis. They use a specialized enzymatic machinery that degrades components of the extracellular matrix. Tartrate-resistant acid phosphatase (TRAP) is one of these enzymes and is highly expressed in OCs. Pyk2 is a tyrosine kinase previously shown to control OCs in part by regulating the formation of podosome adhesion structures in the sealing zone; a ring-like structure that allows OCs to attach to bone. Hypotheses: The LIP technique will result in more bone resorption on the ligated side vs. the control side. Secondly, mice lacking Pyk2 in osteoclasts (FF/C+) will exhibit less bone resorption than WT.

Experimental methods: Pyk2-Trap-Cre mice (FF/C+) that lack Pyk2 in OCs were generated by mating Pyk2^{fl/fl} with Trap-Cre mice. Littermate controls were FF/C-. 7-12 mice/group underwent LIP. After 5 days, maxillary bones were harvested. Ex-vivo micro-computed tomography (μ CT) scanning determined TV, BV, and BV/TV of alveolar bone under the buccal roots. A t-test was used for statistical analysis. Results: The average alveolar bone volume (BV, mm³) for all groups was significantly decreased in the ligated (0.047 ± 0.006) vs. the control side (0.045 ± 0.006). However, there were no differences in bone loss % between genotypes (FFC- vs FF/C+) of either sex. Conclusion: Although the Pyk2-Trap-Cre (FF/C+) mice were not protected from alveolar bone loss vs. WT, the LIP method was validated: in all animals, the ligated side had less alveolar bone volume or experienced more resorption, than the control side in the same mouse. Thus, deleting Pyk2 only in TRAP-expressing osteoclasts is not sufficient to prevent bone resorption after a LIP challenge.

P65 Global Pyk2 deletion Affects Osteoblast Activity in Male but not Female Mice. J. ABULAIL*, K. CHESTER, J.M. HONG, A. BRUZZANITI (Indiana University School of Dentistry)

Background: Osteoporosis affects over 10 million Americans. This bone disease is due to an imbalance between osteoclast resorption and osteoblast formation, favoring resorption leading to an overall net bone loss. This compromised bone state leads to increased risk for bone fracture. Deletion of Pyk2 (Proline-rich tyrosine kinase 2), a focal adhesion kinase, has shown to increase overall bone mass of female mice. However, whether the deletion affects the activity of osteoblasts, osteoclasts, or both, and the role of Pyk2 in males versus females is still unclear. Hypothesis: Global deletion of Pyk2 in a mouse model will result in increased bone mass in male and female mice due to an increase in osteoblast number. Method: A mouse model with global knockout (KO) of Pyk2 was used. At 16 weeks, tibias were extracted from both female and male Pyk2-KO and control C57Bl/6 mice (WT) (N=6/group). Mid-sagittal cancellous bone sections (4 μ m) were stained with Von Kossa and McNeil's for measurement of total volume (TV), bone volume to tissue volume (BV/TV), osteoblast number (N.Ob), osteoid volume (OV), osteoid width (O.Wi), and number of osteoblast per bone surface (N.Ob/BS). Statistical comparison between genotypes for each sex was determined by student t-test ($p < 0.05$). Histomorphometry analysis was conducted via Bioquant Software. Results: Female Pyk2 KO mice did not demonstrate an increase in any osteoblast parameters when compared to the female WT control. In contrast, male Pyk2-KO mice demonstrated an increase in OV, N.Ob, and N.Ob/BS, compared to the sex-matched WT controls. Conclusion: These findings suggest Pyk2 deletion may promote osteoblast activity in male mice, with potential implications for differences in bone health in males versus females.

Clinical Case Report Poster Presentations *DENTAL HYGIENE*

CC01 Modifications in Dental Hygiene Care for Visually Impaired Patients. S. AGRESTA*, K. SPARGER, A. RIECK (Indiana University School of Dentistry)

Objective: To discuss modifications in treatment for a visually impaired patient. Background information: A 31-year-old female presented to the Dental Hygiene clinic for routine prophylaxis. Medical history was positive for visual impairment from retinitis pigmentosa, resulting in only being able to see colors and shapes. Patient uses a white mobility cane and requires guided mobility assistance. Clinical examination: The patient clinically presented with generalized marginal plaque-induced gingivitis evidenced by red, blunted, and shiny gingiva with a 27% bleeding score. Periodontally, the patient presented with gingivitis on an intact periodontium evidenced by 1-3mm CAL (level) with localized 4mm CAL (level) due to inflammation and generalized healthy bone levels as evidenced by 1-2mm from CEJ to crest of bone. The patient's plaque score was 14% and reported brushing twice daily and flossing 3-4x a week. Due to visual impairment and presence of orthodontic appliances, routine oral hygiene is challenging. The patient was classified as high caries risk. Modifications of the appointment were vital to successfully address oral health needs. DH Care Plan: Patient received modified prophylaxis and oral hygiene instructions. Recommendations included the Bass brushing method, water flossing, and an interdental brush. A hands-on demonstration on proper use of an interdental brush for open embrasure spaces was performed. Instructions were accomplished using thorough communication and educating the patient using tactile hands-on learning. Thorough communication and hands-on guidance were imperative, and adjustments were made to ensure quality care. A visually impaired patient presented to the hygiene clinic with mild plaque and high caries risk. In conclusion, properly educating visually impaired patients on oral hygiene is critical in maintaining periodontal health and preventing tooth decay, which can be achieved by using hands-on learning and thorough communication.

CC02 Effects of Oral Piercings on the Dentition and Periodontal Health. M. HERRON*, T. WRIGHT, A. RIECK (Indiana University School of Dentistry)

Introduction: Although the percentage of patients with oral piercings is relatively low, there is a high prevalence of complaints regarding issues related to lip and tongue piercings. Enamel defects, gingival recession, and severe localized bone loss are all examples of periodontal destruction commonly observed in patients with oral piercings. These difficulties emerge from mechanical stress on periodontal tissues caused by metal materials. Background: A 29-year-old female presented to the dental hygiene screening clinic with a negative medical history and a chief complaint of painful gingival tissues. Upon clinical examination, two oral piercings were discovered in the labial mucosa and through the dorsal surface of the tongue. After radiographic interpretation, bone loss to the apical third of the root was observed in teeth adjacent to the oral piercings. Due to these findings, the patient was referred to the graduate periodontal clinic to receive appropriate treatment. Aim: To determine the extent of which oral piercings negatively affect periodontal health. Results: Within our research from several cross-sectional studies, it can be determined that teeth adjacent to oral piercings show increased gingival recession, probing depths, and bleeding scores compared to patients without oral piercings. Conclusion: Oral piercings are likely to have a negative impact on the periodontium and dentition. It is important to educate patients on oral piercings and their negative effects on permanent dentition and periodontal health.

CC03 Management of Patients with Black Hairy Tongue. C. SPARKS*, A. DRAKE, M. CORNEWELL (Indiana University School of Dentistry)

Introduction: Black hairy tongue is a multifactorial, acquired, benign condition that results in elongated filiform lingual papillae with a typical carpet-like appearance on the tongue. This condition can be due to many different factors such as smoking, coffee or tea consumption, poor oral hygiene, and medications. Objective: To educate oral health professionals on the identification, etiology, and treatment of patients with black hairy tongue along with the importance of a thorough assessment. Background: A 64-year-old female presented to the dental hygiene clinic for her periodontal maintenance recall appointment after scaling and root planing had been performed. Assessment: The patient's health history revealed a history of smoking for 45 years about 15 cigarettes per day along with a family history of oral cancer. The patient had been diagnosed with rheumatoid arthritis which is managed with Methotrexate injections that cause daily gastrointestinal

difficulties. The patient manages this with the frequent use of Pepto Bismol. The intra-oral assessment revealed a 3-4mm circular brownish lesion with black filiform papillae on the dorsolateral right border of the tongue that presented with no pain upon palpation. Dental Hygiene Care Plan: Periodontal maintenance was performed along with intra-oral pictures being taken of the lesion to compare to the following visits. Patient education involved smoking cessation, how to effectively clean the tongue, and the recommendation of visiting the patient's physician to manage her gastrointestinal distress differently due to the staining potential of Pepto Bismol. Results: At the patient's second recall, the lesion dramatically reduced in size and color due to the patient's meticulous homecare and discontinuation of the Pepto Bismol. Conclusion: Oral healthcare professionals must be equipped with knowledge of abnormal oral conditions identified upon thorough assessment, excellent patient management skills, and the ability to educate their patients on how to effectively care for the oral environment.

CC04 Fluorosis in a Dental Hygiene Patient. K. WELLS*, G. FRY, T. RADER (Indiana University School of Dentistry)

According to Wilkins' textbook, fluorosis is defined as "enamel hypomineralization, resulting from excessive fluoride ion from any source during the period of mineralization. The enamel alterations are a result of toxic damage to the ameloblasts. Severity is related to the age and dose of fluoride exposure." Objective: As a dental hygienist we need to assess possible causes of abnormal enamel and also be educated on the available options to treat for cosmetic purposes. Background: A 47-year-old white female presented to the IU School of Dentistry's Dental Hygiene Clinic for a dental prophylaxis and a comprehensive oral examination. The patient presents with a negative medical history and reports having fluorosis. Assessment: An intraoral examination was completed and the results were as follows: patient presents with generalized yellow and brown staining on all tooth surfaces along with chalky white spots. Enamel pitting on buccal surfaces was also noted. Upon intraoral examination, specific questions regarding water sources during formative years were asked of the patient, and conclusions were drawn that the patient presents with fluorosis. Care Plan: Dental prophylaxis was recommended for the patient. The patient expressed dissatisfaction with the appearance of her teeth due to fluorosis and asked for treatment options that would improve the esthetics of her dentition. Some treatment options could include microabrasion, bleaching, composite restorations, resin infiltration, veneers, and full crowns depending on the outcome of a consultation with the dentist. Conclusion: It's important that dental hygienists recognize the characteristics of dental fluorosis by obtaining a history of fluoride intake. Once the clinician can determine the patient has fluorosis, appropriate recommendations can be made in conjunction with the dentist's professional opinion for an improved cosmetic appearance.

Clinical Case Report Poster Presentations *ENDODONTICS*

CC05 Resorption of Extruded Calcium Hydroxide during Endodontic Treatment. H. GRANFIELD*, B. ZERO, D. ABUSULEIMAN, Y. EHRLICH (Indiana University School of Dentistry)

Calcium hydroxide Ca(OH)_2 is commonly used as an interim medicament within the tooth root in endodontics. It has a high pH $\cong 12.5$ and contains properties that alkalize the root canal space which provide antimicrobial coverage and can also be used for apexification and promote formation of a hard tissue barrier when in contact with apical tissue. During root canal treatment, Ca(OH)_2 may be extruded into the apical tissue past the apical foramen due to root anatomy, root resorption, or user error. This case report explores two instances of Ca(OH)_2 extrusion and resorption of this medicament into the periapical tissue. The first case presented as #26 necrotic pulp with symptomatic apical periodontitis with external resorption at the apex. The patient experienced trauma on the tooth from a fall in 2019. The second case presented as #9 necrotic pulp with chronic apical abscess with a wide, large canal, arrested root development, and apical periodontitis. The patient recalls trauma on the tooth when he was 14 years old. In both cases, after the canal was shaped and cleaned, patency was maintained, and a Ca(OH)_2 slurry was placed in the canal. In both cases the post-op x-ray showed a "puff" of Ca(OH)_2 . Inadvertently expelled Ca(OH)_2 may sometimes be resorbed or have potential caustic effects, such as gingival necrosis. In both cases, the patients' symptoms improved at the second appointment and the x-ray imaging showed that extruded Ca(OH)_2 was resorbed. Therefore, calcium hydroxide extruded during endodontic treatment may be resorbed from the apical tissue.

CC06 Electric Scooters, a Dental Hazard – An Endodontist’s Perspective. A. BESWICK*, K. SPOLNIK, Y. EHRLICH, C. HINE (Indiana University School of Dentistry). Treating dental trauma is one of the more challenging aspects of dentistry. This case report presents the endodontic treatment of an electric scooter induced trauma, beginning from initial evaluation, 5 months post trauma, through endodontic treatment of teeth #6, 7, and 8 including post-operative follow-ups. There has been an increase in scooter related dental traumas in recent years as electric scooters have become popular in metropolitan areas. Unfortunately, these traumas tend to be more damaging than other types of dental traumas, resulting in greater tooth mortality. The patient in this case report suffered avulsion, horizontal root fracture, and luxation injuries; ultimately resulting in RCT of teeth #6, 7 and 8 with splint placement. It is important for the general dentist to understand how to appropriately triage patients with these types of injuries as patients will often present to their general dentist for first line treatment. Early and correct treatment can allow for patients to retain teeth that would otherwise be lost. Many resources on treatment of dental trauma are available which general dentists and endodontists alike should be aware of. In this case report successful endodontic treatment will allow the patient to keep her natural dentition as long as possible before needing to seek additional treatment.

CC07 Retreatment of Symptomatic Molar with Complex Anatomy: A Case Report. M. GRAYSON*, Y. EHRLICH, K. SPOLNIK, N. WARNER (Indiana University School of Dentistry)
Introduction: Complex anatomy, such as curved canals, can complicate endodontic treatment. Diligent preoperative planning including additional imaging and selecting instruments that can accommodate curved systems are prudent to maintain the anatomy of curved canals. This case report describes the treatment of a mandibular molar, diagnosed as previously treated with symptomatic apical periodontitis. A 30-year old female presented to the graduate endodontic clinic with the CC “I was having spontaneous throbbing pain after my root canal two months ago”. Tooth #18 was evaluated, a CBCT was taken: widened PDL, 2 roots, 2 mesial canals (Weine Type II), 2 distal canals (Weine Type IV, sharp curve in apical 1/3 to the buccal); mesial buccal, mesial lingual, distal buccal canals were noted to have filling material present, distal lingual canal was not instrumented or obturated. Under RDI, tooth #18 was accessed. Gutta percha was present in MB, ML, DB; the DL canal was located. Gutta percha removed with muncce bur, rotary instruments, solvent, and paper points. Patency established with #10 hand file and confirmed with EAL. Copious irrigation with 6% NaOCl, dried canals, CaOH placed, gray and pink cavit placed in access. Patient returned 6-weeks later, asymptomatic since instrumentation. Under RDI, removed pink/gray cavit, 6% NaOCl and RC-Prep used with hand and rotary instruments, MB, ML, DB, DL finished with 30 .04 Edge X7, coronal and middle 35 .04 Edge X7 used. Final irrigation with 6% NaOCl, EDTA, followed by sterile water. Dried canals. Obturation with gutta percha and BC sealer using continuous wave condensation. BC Blue Liner placed over orifices. Gray and pink cavit to close. Conclusion: This case report demonstrated the value of additional imaging to visualize complex anatomy and the importance of maintaining the original anatomy of curved canal systems using hand instruments and appropriate rotary files.

CC08 Vital Pulp Therapy in a Diabetic Pediatric Patient with Apical Periodontitis. S. MAGURA*, Y. EHRLICH, K. SPOLNIK, N. WARNER (Indiana University School of Dentistry)
Objective: To report the successful use of Vital Pulp therapy (VPT) in the treatment of a deep carious lesion in a diabetic pediatric patient. A 12-year-old male with his grandmother presented to Endodontic Dept for evaluation. The patient was very interested in saving his teeth. Medical History: Type-1 diabetes. The extraoral exam was noncontributory. Intraoral exam revealed extensive DO decay on #19. X-ray and CBCT imaging showed that #19 had DO caries which was approximating the distal pulp horn and calcifications in the orifices of each canal. Sparse trabeculation and a widened PDL were noted at the distal root apex. #19 diagnosed as Irreversible Pulpitis with Symptomatic Apical Periodontitis. Treatment: Nitrous oxide and local anesthetic was administered. After caries removal a pulp exposure was noted and cervical pulpotomy completed. The pulp wound was dressed with a bioceramic material “Biodentine™” and covered with BC liner. A stainless-steel crown was then placed in the pediatric department. The patient was asymptomatic and 8

months after endodontic treatment the patient initiated orthodontic therapy. At 15 months #19 was asymptomatic and responded normally to sensibility testing. The post-op CBCT displayed intact PDL space with slight distal root apical resorption but no periapical lesion. Conclusion: *Calaskin et al.1995*, have demonstrated VPT can be used in permanent molars with irreversible pulpitis and apical periodontitis. This case report confirms that VPT using a bioceramic material to dress the pulp wound is an alternative to treating carious pulp exposures in permanent teeth with AP. VPT is a viable alternative to root canal therapy with respect to patient management and expense.

CC09 Endodontic Treatment of Lower Premolar with Unique Three-Canal Anatomy. S. PATTERSON*, K. SPOLNIK, Y. EHRLICH, N. WARNER (Indiana University School of Dentistry)

Introduction: Identification of potential unique or supplemental root canal anatomy is paramount for proper endodontic treatment when present as additional treatment considerations and strategies are needed for successful outcomes. Mandibular second premolar's have a reported occurrence of single canal, two canal, and three canal morphology in 97.5%, 2.5%, and 0.4% of teeth respectively. Three-canal premolars also known as "mini-molars" due to their anatomic similarities with molar teeth, are rare and present significant challenges for root canal treatment. This case reports highlights the unique morphology and subsequent endodontic treatment of a lower second premolar with "mini-molar" anatomy.

Case Report: A 59-year-old male presented to the VAMC dental clinic with tooth pain in the lower right quadrant. Endodontic sensibility testing was performed and the clinical diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made for tooth #29. Conventional periapical radiography showed #29 had a large direct resin restoration into pulp tissue and an abnormal root morphology with multiple canals present was detected. Due to the abnormal anatomy a supplemental LFOV CBCT image was obtained. #29 displayed a broad fused root system with C-shaped buccal canals (mesiobuccal and distobuccal) and a separate distolingual canal orifice, two separate apical foramina, and apical PDL widening. Endodontic treatment was initiated, and root canal therapy was completed over two visits. Three separate canals were identified. Adequate access and cleaning of the canal system required supplemental ultrasonic use and multiple intra-operative X-rays. After working-length determination and gross debridement was completed, the tooth was medicated with calcium hydroxide medicament and a temporary cavit filling was placed. The patients returned 4 weeks later, and symptoms had resolved. Root canal treatment was completed with gutta percha and BC-sealer using warm vertical compaction and the access cavity restored immediately with RMGI.

Clinical Case Report Poster Presentations ORTHODONTICS / IMAGING / CRANIOFACIAL

CC10 Orthodontic Considerations in Interdisciplinary Treatment. E. ANDERSON*, K.T. STEWART (Indiana University School of Dentistry)

Introduction: Management of complex interdisciplinary cases requires intentional and effective communication between specialists. Many of these patients have missing dentition, which makes proper sequencing and execution of treatment imperative to provide excellent patient-centered care where stability, functional demands, and esthetic goals are prioritized. This case report features interdisciplinary patient care involving management of TMJ concerns, orthodontic treatment, orthognathic surgery, and prosthodontic replacement of missing teeth. Case Presentation: A 46 year-old male patient presented to the IUSD TMJ Institute with a chief concern of chronic TMJ pain beginning at 14 years old. Management involved an interdisciplinary approach with a referral to physical therapy and the IUSD Orthodontic and Prosthodontic clinics. The patient was diagnosed with a Class III skeletal relationship due to a retrognathic maxilla and Class IV dental malocclusion due to missing posterior dentition. His maxillary incisors were proclined, mandibular incisors were retroclined, and all maxillary teeth were in lingual crossbite. The proposed orthodontic treatment involved aligning and leveling both arches, decompensating the teeth into a more optimal position within the alveolus, and consolidation of spaces. The pre-surgical orthodontics took 18 months, after which the patient was sent for a maxillary advancement surgery and a mandibular BSSO with yaw correction. Following surgery, an

interim partial denture was fabricated and delivered to establish and maintain the vertical occlusal dimension. The planned prosthodontic replacement of the patient's missing teeth will include posterior implants, which will be initiated after the completion of post-surgical orthodontic treatment. The patient is very pleased with the functional and esthetic changes achieved by orthodontic and orthognathic treatment within 21 months. Conclusion: With effective collaborative planning and treatment execution, interdisciplinary case outcomes can be extremely rewarding and help to dramatically improve the quality of life for the patients we serve.

CC11 Growth Modification Therapy to Correct a Class III Malocclusion. A.E. BOJRAB, H. TURKKAHRAMAN (Indiana University School of Dentistry).

Introduction: Growth modification therapies are often implemented in growing patients with jaw discrepancies to non-surgically correct skeletal differences. In mandibular prognathism or maxillary retrognathism, the application of rapid maxillary expansion (RME) and protraction facemask (PFM) can correct this unfavorable relationship skeletally and dentally. Case Presentation and Results: A 7-year-old Caucasian boy presented to Indiana University School of Dentistry (IUSD) Graduate Orthodontic Clinic with the chief complaint "I'm here for my underbite." His medical history revealed no contraindications to treatment. Radiographic analysis reveals a normal mandibular plane angle, a skeletal Class III malocclusion ($ANB=4^\circ$), and a retrognathic maxilla ($SNA=77.5^\circ$) His clinical exam reveals 3mm of reverse overjet, 2mm anterior functional shift, and a maxillary transverse deficiency. An acrylic bonded expander with 9 mm Hyrax expansion screw was activated twice daily for 7mm expansion. Subsequently, a PFM was delivered with ~600 grams of force applied via elastics attached to the hooks mesial to the primary canines. The patient wore the appliance at least 12 hours daily for 9 months. Routine checks were performed to monitor force levels and adaptation of the appliance. After 9 months, the appliances were removed and records were collected. Clinical exam revealed a more convex profile, 3mm of positive overjet and adequate transverse dimension of the maxilla. The post-treatment cephalometric analysis showed a decrease in ANB to 0° and an increase in SNA to 81° . The retention of choice was a chin cup to be worn nightly. 2 months post-treatment clinical evaluation revealed stable results. Patient will be monitored every 6 months and a phase II treatment including fixed orthodontic treatment scheduled at the late mixed dentition stage. Conclusion: This case report reveals a successful growth modification treatment of a skeletal Class III malocclusion using RME and PFM.

CC12 Meticulous Orthodontic Treatment Planning Ensures Precise Anchorage and Biomechanics. R. HOAGBURG*, D. JOHNSON (Indiana University School of Dentistry)

Introduction: Orthodontic cases that present with extreme dental asymmetries must be meticulously planned in order to manage tooth movement and optimize patient outcomes. This case highlights how proper treatment planning prior to the start of treatment allows for precise orthodontic anchorage and biomechanics. Orthodontic anchorage is the resistance to movement of a tooth or group of teeth through different techniques. This case demonstrates how a temporary anchorage device (TAD) can provide increased anchorage. Patient Background: A 17-year-old male patient presented to the IUSD Graduate Orthodontic Clinic with a chief complaint of "I think I need braces". He had a history of a repaired soft palate cleft. He was congenitally missing lower second premolars with a retained primary second molar in the lower left quadrant (tooth #K) and complete closure of the space on the right. He was class III molar subdivision right malocclusion with a class II canine on the right and a class III canine on the left. The upper dental midline was off to the left 3 mm from the face and the lower dental midline was off to the right 2mm from the face. Tooth #10 was in anterior crossbite. A stepwise treatment approach was used to focus on centering both the upper and lower dental midlines as well as achieving class I canine. An asymmetric extraction pattern, supplemented by a TAD-supported TPA (trans-palatal arch), was utilized to help maintain molar position while shifting the upper dental midline. The TAD was placed in the anterior palate based on assessment of the bone via CBCT as well as the anterior palate being the best location for TADs in adolescents. Conclusion: Thorough treatment planning with a focus on proper biomechanics and anchorage leads to excellent patient outcomes.

CC13 Biomechanical Considerations in a Hypodivergent Deep Bite Patient. M. LEAR*, D. JOHNSON (Indiana University School of Dentistry)

Background: Severe deep bites in patients with low mandibular plane angles can present challenges orthodontically. Carefully planned biomechanics must be implemented to obtain leveling in the mandible and open the bite. The case outlined below depicts biomechanical considerations and treatment appropriate in correcting a severe deep bite in a hypodivergent patient. Patient Background: A 22.11-year-old female patient presented to the IUSD Graduate Orthodontic Clinic with a chief complaint of “I want an implant and I need to straighten my teeth.” She had a Class II subdivision right malocclusion, slight mandibular transversal discrepancy, and was missing tooth #8. The area of #8 was not amenable to implant placement at presentation due to 100% overbite with palatal impingement by the mandibular incisors. Her Curve of Spee measured at 3mm and her lower incisors were slightly retrusive and in a normal range of inclination. Her brachycephalic facial presentation was supported by her considerably low mandibular plane angle. The mandibular arch can be leveled by two methods, either through extrusion of the posterior teeth or intrusion of the anterior teeth. In this case, intrusion of the anterior teeth was most appropriate. Methods to achieve this correction included employment of a maxillary removable anterior bite plate, which incorporated a pontic to replace #8, as well as a continuous mandibular intrusion arch ligated to #23-26. Conclusion: The successful management of a skeletal deep bite requires orthodontic treatment paying careful attention to biomechanical principles directed by dental, facial, and skeletal goals for patient outcomes.

CC14 Utilization of Clear Aligner Therapy in Management of Adult Patients. C. LILES*, K.T. STEWART (Indiana University School of Dentistry)

Background: Adults seeking orthodontic care has increased in recent years due to improved accessibility and treatment options that appeal to this patient demographic. As more adults pursue orthodontic treatment, the profession has encountered new challenges including more stringent esthetic demands, along with how to safely and efficiently execute orthodontic treatment with non-ideal periodontal statuses. As the prevalence of clear aligner therapy in adult patients becomes more commonplace, it is imperative that we understand this treatment modality’s benefits, shortcomings, and influence on function and esthetics. Patient Background: A 49-year-old black female patient presented to the IUSD Graduate Orthodontic Clinic with a chief complaint of “My dentist told me my bottom teeth are loose with gaps because of how I bite”. She presented with a Class III subdivision left malocclusion and generalized mandibular spacing. An anterior crossbite was evident and she exhibited grade II mobility on teeth #23-26 resulting from traumatic occlusion. The suspected etiology of the malocclusion was late mandibular growth and a tongue thrust habit. Emphasized the need for correction of the anterior crossbite to remove traumatic occlusion and improve periodontal health of mandibular anterior teeth. To correct the malocclusion but limit the potential to exacerbate the patient’s periodontal condition, clear aligners were utilized. Custom attachments were added to optimize tooth movement. After 126 total trays over 16 months, the patients anterior crossbite and anterior spacing was resolved. The patient is currently undergoing an additional phase of aligners to enhance her posterior occlusion and support long-term stability. Conclusion: This case report demonstrates that the careful utilization of clear aligner therapy can allow clinicians to deliver effective treatment in adult populations. Along with good patient compliance, clear aligners can elicit successful outcomes in more difficult cases.

CC15 Clinical Considerations in Maintaining Tooth Transposition in the Esthetic Zone. J. MAGURA*, J. HUGHES (Indiana University School of Dentistry)

Background: Ectopic eruption of a maxillary canine is most often due to arch length deficiency. In addition an ectopic canine can be transposed, or in a position interchanged with an adjacent tooth. A canine transposition is the most common form of transposition seen in patients and more commonly present in the maxilla. There are several options in treating this tooth anomaly such as: extracting one of the transposed teeth, maintaining the transposition, or correcting the transposition. The treatment planning process can be influenced by esthetic and functional demands of the case, patient goals and financial constraints, and the clinician’s expert opinion on the matter. The following case highlights these issues involving a maxillary left ectopic canine that is transposed. Patient Background: A 12.6 year old female presented to the IUSD Graduate Orthodontic Clinic with the chief complaint of “my tooth is coming in funny.” She had no significant medical history. She presented with class I malocclusion and an ectopic eruption with transposition of the left

maxillary canine. After reviewing the patient's CBCT to examine the root position of the canine and first maxillary premolar and the overlying bone, a treatment decision was made to maintain the transposition. This option provided the least potential risks while meeting our goals for the patient. Emphasis was placed on the transposed teeth needing interdisciplinary treatment including potential gingivectomy, crown contouring or potential restorations to achieve an optimal esthetic result. Conclusion: Successful management and decision making of maintaining a tooth transposition in the esthetic zone includes careful attention to orthodontic technique, weighing risks and benefits, and interdisciplinary communication to achieve the optimal result.

CC16 Clinical Considerations in Utilizing Mini Screw Assisted Rapid Palatal Expander. M. MYERS*, D. JOHNSON (Indiana University School of Dentistry)

Background: Within orthodontic treatment, dental expansion occasionally becomes necessary due to a posterior transverse deficiency in the maxilla relative to the mandible. Ideally, palate expansion occurs during early mixed dentition when the mid-palatal suture remains patent. Typically, the mid-palatal suture fuses during sometime during adolescence. However, there are instances where a patient's palatal sutures fuse, rendering tooth-borne expanders ineffective in separating them. This case underscores the inadequacy of a tooth-borne expander and the subsequent transition to a skeletal-based expander to rectify a posterior crossbite. Patient Profile: A 14-year and 7-month-old African American female presented with a chief complaint "I don't like the space between my top and bottom teeth.". She exhibited a class III malocclusion with bilateral posterior transverse deficiency and an anterior crossbite. Initially, she was slated for a conventional rapid palatal expander. However, after two months of activation, it was evident that skeletal expansion across the sutures had not occurred; rather, there was only dental tipping. Consequently, the expander was removed, allowing the teeth to revert to their original positions for one month. Following the posterior segment's relapse, a new treatment approach was pursued. A temporary anchorage device (TAD), or mini-screw supported expander, was introduced with four mini-screws embedded into the hard palate. This new expander underwent activation for two months until proper posterior overjet was achieved, accompanied by the creation of a midline diastema, indicating successful expansion. The expander will remain in place for an additional six months following active expansion before removal. Conclusion: Traditional rapid palatal expansion can yield benefits in adolescent patients prior to the fusion of the mid-palatal suture, a process which varies among individuals. However, in more skeletally mature patients, the utilization of mini-screw supported palatal expanders presents itself as a viable alternative for achieving successful palatal expansion.

Clinical Case Report Poster Presentations *PERIODONTICS*

CC17 A Case Report and Review of Characteristics of Oral Focal Mucinosis. N. MCKEE,* H. ALQALLAF (Indiana University School of Dentistry)

Oral focal mucinosis (OFM) is a rare benign lesion characterized by the presence of focal accumulations of mucin within the oral soft tissues. Here, we present a case report of a 50-year-old Hispanic male who presented to the Graduate Periodontics Clinic with a chief complaint of a soft tissue mass on the palatal gingival margin of #8. The patient reports severe pain, rated 10/10 on visual analog scale. Clinical examination revealed a firm, nodular mass with erythematous overlying mucosa that appeared ulcerated due to trauma from mastication. Radiographic evaluation did not reveal any associated bony changes. An excisional biopsy was performed, and histopathological examination revealed a diagnosis of oral focal mucinosis with local ulceration. The patient was managed with analgesics and a 10-day and 4-week evaluation. OFM does not tend to recur, but the patient will be evaluated at every maintenance appointment for any changes to the soft tissue. Given our results, it is reasonable to consider OFM in the differential diagnosis of lesions presented on the gingival margin and palatal soft tissue masses.

CC18 Mandibular Block Graft for the Treatment of Horizontally Deficient Ridge. B. FREEMAN*, H. NAMLI KILIC (Indiana University School of Dentistry)

Introduction: Block grafts have been used for the treatment of isolated horizontal defects successfully. This case report describes the treatment of horizontally deficient ridge at a single edentulous site using an autogenous block graft. Results: A 76-year-old Caucasian female was referred to IUSD Graduate Periodontal Clinic with Chief Complaint: "I need an implant". Patient reported extraction of tooth #21 in a private practice setting. Clinically, horizontal deficiency noted in the area of #21. Radiographic evaluation carried out through CBCT revealed inadequate horizontal dimension for implant placement. After verification of profound anesthesia, a full thickness mucoperiosteal flap was elevated around #21. A second surgical site was accessed on the buccal aspect of #18 to harvest an autogenous block graft. The recipient bed was decorticated using 1/8 round bur. Autogenous bone graft was harvested from the same donor site with a bone scraper and placed on the recipient bed prior to block graft placement for better adaptation of the block graft. The autogenous block graft was pre-drilled and placed over the autogenous scrapings and secured with a single fixation screw. Demineralized Bovine Bone Matrix (Bio-Oss) was rehydrated in sterile saline and placed over the block graft. A non-crosslinked collagen matrix (Bio-Gide) was placed over both graft materials prior to performing a periosteal release to ensure tension free primary closure of the surgical site. Post-operative healing proceeded without any complications. 18 weeks following the surgical procedure a second intra-oral scan and CBCT were exposed. Ridge expansion via block grafting resulted in an increase in horizontal bone dimension by ~3.1mm. Surface scan comparisons also yielded a clinically significant increase in ridge dimension. Conclusion: The use of autogenous block grafting is a predictable technique for increasing both the available bone volume and clinical ridge width in a healthy patient.

CC19 Management of Multiple Challenging Recession Defects with Different Surgical Techniques. H.C. LEE*, M. GIBSON, H. ALQALLAF (Indiana University School of Dentistry)

Introduction: Even though the coronally advanced flap (CAF) + CTG is deemed the gold standard for root coverage procedure, modified CAF techniques and alternatives to autogenous graft were extensively studied to reduce patient morbidity and invasiveness of the surgical procedure. This case report describes the treatments of multiple gingival recession with the use of Acellular Dermal Matrix (ADM) in combination with different modified CAF techniques. Case presentation and results: A 35-year-old, ASA I, Hispanic female was referred to IUSD Graduate Periodontal Clinic for a consultation regarding generalized gingival recession. The patient had history of orthodontic treatment and #24 root coverage with CAF and the use of connective tissue graft. 1-5mm RT1 and RT2 facial gingival recessions were observed throughout the mouth. Unfavorable prognostic factors including interdental attachment loss, thin tissue phenotype, narrow keratinized tissue band, and severe biofilm-induced gingivitis were noticed in the mandibular arch and non-carious cervical lesion presented on recession defects of maxillary canines. Before the CAF procedures, phenotype modification and partial coverage were achieved with free gingival grafting performed in #24-25 area. Six months later, considering the different locations and anatomical limits, the root coverage procedure was performed with three different CAF techniques: CAF with vertical releasing incisions, tunneled-CAF and enveloped-CAF in combination with the application of ADM. Significant recession defect reduction was observed. Complete root coverage was achieved on the RT1 recession sites. Residual defects on RT2 recession were less than 1mm. Adequate tissue thickness and keratinized tissue width were obtained in all treated sites. Conclusion: This case report demonstrated that the properly planned and executed modified CAF techniques can effectively manage challenging RT2, multiple recessions, and cervical abrasion cases. Furthermore, ADM is a reliable alternative option to autogenous graft for root coverage in combination with different CAF techniques.

CC20 Revision Following ADM Exposure, Using Autogenous Graft and Double Pedicle. E. ROSE*, H. NAMLI KILIC (Indiana University School of Dentistry)

Introduction: Abundant literature exists demonstrating that autogenous connective tissue grafts (CTG) are the gold standard in maximizing root coverage outcomes. Allogenic dermal matrix (ADM) is a proven alternative in the treatment of gingival recessions, although exposure during healing can lead to adverse healing outcomes. This case report describes the treatment of a wide and deep recession defect resulting from a previous attempt at root coverage using ADM. Treatment included the use of a CTG in combination with a split-thickness double pedicle flap. Case Presentation and Results: A 46-year-old Hispanic male was referred to the IUSD Graduate Periodontal Clinic for evaluation of generalized recession. Patient presented with 2mm of midfacial recession at site #22, and peri-apical radiograph revealed no loss of interproximal attachment. Following ADM treatment, patient presented at the 3-week post-op with loss of ADM and increase in recession depth to 4mm with absence of keratinized tissue (KT). Revision surgery was planned with use of an autogenous CTG. Prior to incisions, root surface was debrided and planed with curettes. Following sulcular incision, horizontal incisions were made interproximally with vertical incisions at each end. Sharp partial-thickness dissection was performed to release the mesial and distal pedicles until the flaps were passive under function. The pedicles were then sutured together, root prominence was aggressively reduced, and CTG was harvested. CTG was stabilized with interrupted sutures, and pedicles secured with sling sutures. Cellulose and cyanoacrylate mesh were then applied over the pedicles. At 3 weeks post-op, adsorption of sutures, exfoliation of mesh, tissue edema, along with complete root coverage was noted. 5-week follow-up revealed edema resolution, 1mm of KT, and 1mm persistent recession. Conclusion: This case report demonstrates that the use of an autogenous CTG with a double pedicle flap can attain root coverage in sites previously exhibiting healing complications following ADM use.

CC21 Management of a Mucogingival Deformity Adjacent to an Implant. L. ROY*, B. ROY, H. ALQALLAF (Indiana University School of Dentistry)

Introduction: The purpose of this case report is to demonstrate a method to achieve root coverage, gain keratinized tissue width, and eliminate frenum pull on a single maxillary anterior tooth adjacent to an unrestored implant. Results: A 56-year-old Caucasian female was referred to IUSD Graduate Periodontal Clinic for treatment of a recession defect on her left maxillary lateral incisor adjacent to an unrestored implant. Tooth #10 presented with two millimeters of recession on the mesiofacial aspect and 5 millimeters of recession on both the midfacial and distofacial aspects. The recession defect on #10 was deemed an RT 2 recession defect based on the Cairo classification. A periapical radiograph showed horizontal bone loss distal to #10, extending to the middle third of root. One month prior to the grafting procedure, a labial frenectomy was completed to eliminate the frenum pull on #10. Recipient site preparation: a sulcular incision was made from the mesiofacial line angle of #10 to the distofacial line angle of #10 in order to create a split thickness tunneling incision apical to #10. Small two millimeter angular incisions were made at both the mesial and distal aspects of #10. Donor site preparation: A single horizontal incision was made two millimeters from the CEJ of teeth #3 and #4. A one millimeter thick subepithelial connective tissue graft was harvested and placed into the recipient site with three millimeters of the graft exposed. Six weeks following the graft, tooth #10 showed a gain of keratinized tissue width and adequate root coverage. Conclusion: Exposed subepithelial connective tissue grafts following a labial frenectomy, can achieve good root coverage and increased keratinized tissue width in an RT2 recession defect adjacent to an implant.

CC22 Management of Peri-Implantitis Bone Defects with Regenerative Surgical Therapy. R.VELGIS* H. ALQALLAF (Indiana University School of Dentistry)

Introduction: Management of peri-implantitis defects can be complex and may involve the need of both hard and soft tissue regeneration. This case report describes the management of a peri-implantitis defect around #12-14. Case Presentation and Results: 72-year-old Caucasian female was referred to the IUSD Graduate Periodontics Clinic for evaluation of #12-14 implants placed 20 years ago. The deepest probing depth on #12 was 9mm, 13mm on #13, and 13mm on #14. Peri-apical radiograph showed about 50% bone loss on the mesial of #12 implant with about 50% bone loss circumferentially on #13. Patient wanted to try and save #12 and #14 therefore, explantation of #13 and GBR was elected. The crowns were removed, and a full thickness flap was reflected. Implant #13 was explanted, and the area was debrided with curettes. The exposed implant

threads of #12 were mechanically debrided with titanium curettes and chemically treated with diluted tetracycline. The area was then grafted using xenogenic bone graft and a collagen membrane was stabilized over the area. Complete primary closure was obtained and healing was uneventful. At 6 months, peri-apical radiographs were taken and they showed almost complete resolution of the defect. At this point, additional tissue augmentation was done using a porcine collagen matrix, to enhance tissue thickness. After 2 months, second stage surgery was done to expose the implants and proceed with the restorative phase. Conclusion: successful management of peri-implantitis defects is possible through guided bone regeneration and soft tissue augmentation.

Clinical Case Report Poster Presentations *PROSTHODONTICS*

CC23 Monolithic Additive Manufacture Complete Denture. A. BLANKENBAKER*, T. NAGAI, B. HANES (Indiana University School of Dentistry)

Introduction: Monolithic additive manufacturing of complete dentures, particularly through Material Jet technology, is gaining prominence. The rise is driven by enhanced functionality, material excellence, and time efficiency in CAD/CAM dentures, especially those produced through monolithic subtractive manufacturing (milling). Drawbacks of monolithic milling dentures include substantial material wastage, elevated costs, and limited teeth library options. Additive manufacturing is recognized as a promising and economically friendly method for complete dentures, with potential for high reproducibility and acceptable quality. The monolithic additive manufacture of complete dentures through Material Jet technology addresses limitations of earlier 3D printing methods. Unlike other 3D-printing technologies, Material Jet enables simultaneous deposition of various materials, facilitating monolithic 3D-printing of complete dentures. This patient report highlights the successful utilization of a monolithic 3D-printed complete denture with a digital workflow, meeting specific patient desires and expectations. Material and Methods: The patient requested an exact replication of anterior teeth shape and alignment from an existing denture. An optical scan of the existing denture created a 3D-printed copy using DLP technology as a custom tray. Border molding involved heavy body PVS impression material, completed by a light body PVS wash impression. A meticulous centric relation record with Aluwax, reinforced by PVS material, was digitally scanned for the complete denture's digital design in 3Shape software. Collaboration between authors and the dental technician verified the design through a web meeting. A trial 3D-printed denture ensured design accuracy in the patient's mouth. Following confirmation and shade selection, the monolithic MJ technology denture, produced using TrueDent™, was placed, resulting in patient satisfaction. Conclusion: Monolithic additive manufacturing offers a promising method to enhance complete denture fabrication efficiency for clinicians and patients.

CC24 Repair of The Metal Acrylic Implant Supported Mandibular Fixed Prosthesis. S. ALAREIFI*, T. NAGAI, C.C. YANG (Indiana University School of Dentistry)

Introduction: The mandibular implant supported fixed complete prosthesis offers patients a reliable and durable solution for the restoration of mandibular edentulous condition, enhancing both functionality and esthetics. Various materials, including metal-acrylic, metal ceramic, and monolithic zirconia, have been used in these types of prostheses. The primary advantage of metal acrylic implant-fixed complete prostheses lies in their ability to repair without the necessity of stating over the entire procedure due to technical complications. Common technical complications of this type of restoration include fractures, loosening, or wearing of the prosthetic components over time. Case Presentation and Results: This patient report addresses one of the methods for repairing a fractured metal acrylic implant-supported fixed complete prosthesis and emphasizes the importance of meticulous treatment planning. Opposing arch impression and pick-up impression of the fractured prosthesis were made to gather necessary information. After a detailed assessment of the damaged prosthesis, including the metal framework, the prosthesis was repaired in the lab. The titanium metal framework was adjusted to accommodate limited restorative space before new denture teeth were set up, using the opposing denture as a reference, followed by processing with acrylic

resin (XPLEX, Candulor AG, Glattpark, Switzerland). After prosthesis placement, regular follow-up appointments were scheduled to monitor the health of the implants and prosthesis, which is crucial for ensuring early detection and management of any potential problems. Conclusion: In conclusion, metal acrylic fixed implant prostheses offer a distinct advantage in terms of repairability, and the repair process is comparatively simpler and more efficient. Furthermore, ensuring proper spacing not only enhances the structural integrity of the prosthesis but also reduces the risk of complications associated with insufficient space for acrylic material. Thoughtful planning and precise execution are crucial in improving patient outcomes and satisfaction in dental implant procedures.

CC25 Immediate Implant Placement and Loading in Terminal Dentition: Clinical Report.

D. ALQAHTANI*, D. MORTON, W.D. POLIDO, W.S. LIN (Indiana University School of Dentistry)

Purpose: A clinical report to describe full mouth rehabilitation in patient presented with terminal dentition.

Clinical report: This clinical report describes a 61-year-old Caucasian male with terminal dentition in both arches. The patient was not satisfied with the appearance and function of the remaining dentition. The patient presented with generalized recession, gingival inflammation, mobility, tooth malalignment, calculus, and plaque deposition. The patient denied having any medical conditions. Treatment options were discussed with the patient, and he accepted the treatment with immediate placement and loading with 4 implants and maxillary and mandibular implant-supported fixed complete dentures. Intraoral and CBCT scans were taken. Digital surgical and prosthetic planning was done using CAD/CAM and implant planning software programs. Four bone-level tapered implants and screw-retained abutments were placed in the maxilla, and four tissue-level implants were used in the mandible. Extraction and implant placement were done. The immediate loading prostheses were delivered within 24 hours of implant placement. After 4 months, maxillary and mandibular final impressions were taken using polyvinyl siloxane material. Definitive casts were verified intraorally with verification devices. Implant-supported record bases were used to evaluate the vertical dimensions, esthetics, and phonetics. Tooth arrangements were completed with trial insertions. Trial tooth arrangements were scanned using a laboratory scanner and used to design prototypes. The milled PMMA prototypes were provided to the patient for 3 weeks to verify the desired clinical outcomes. Afterward, the prototypes were scanned with the laboratory scanner and used to design definitive prostheses. Definitive maxillary and mandibular monolithic zirconia implant-supported fixed complete dentures were delivered. Treatment outcome: The patient was followed up for 3 months, and no complications were observed.

Conclusion: The advantages of immediate implant placement and loading in terminal dentition included immediate restorations of the patient's function and aesthetics after surgery and reduced numbers of appointments.

CC26 Application of Conventional Bar-Overdenture to Treat Severe Maxillary Atrophy Patient.

R. MURAI*, C.C. YANG, W.D. POLIDO (Indiana University School of Dentistry)

Introduction: In patients with maxillary atrophy, fixed implant-supported complete dentures may not be a viable treatment option due to the absence of keratinized tissue and maintenance complexities. As an alternative, an implant support bar overdenture presents a viable treatment option. Recent advancements in denture base materials have enabled the fabrication of bar overdentures using monolithic milled materials, eliminating the need for a metal substructure. This approach reduces the number of clinical steps and appointments required. However, this treatment approach demands a bulkier denture base to maintain the structural integrity of the implant overdenture. This case report describes the treatment of a maxillary atrophy patient with conventional implant bar overdenture utilizing a CAD-CAM approach. Case presentation and Results: A 75-year-old Caucasian female was referred to IUSD Graduate Prosthodontics Clinic with the chief complaint "I want to have implant supported complete denture." The patient had stainless steel crowns two years ago, lost her maxillary bilateral premolars, and was interested in having an implant supported complete denture. Three zygomatic implants with ZAGA approach and one endosseous implant were placed based on the implant

plan. Three months after the surgery, the second stage surgery was done. The master casts were fabricated, and the occlusal record was taken, followed by a wax denture try-in. The metal bar and metal substructure were fabricated. Denture teeth were set on the framework and tried in to ensure satisfactory esthetics and function. The definitive denture was then fabricated onto the metal substructure. Conclusion: This case report demonstrates that the application of metal substructure into the denture base material contributes to the patient's satisfaction.

CC27 Digital Implant Planning for Limited Restorative Space Implant-Supported RPD. T. SIYOOTAGRAI*, C.C. YANG (Indiana University School of Dentistry)

Introduction: Removable partial dentures (RPD) have been clinically successful in restoring esthetic and function in patient with partial edentulism. However, patients with distal extension RPDs have experienced difficulties during function due to reduced mucosal support in the edentulous area, which compromises the retention and stability of the prosthesis. To overcome the issue, an implant-supported RPD will be suggested. Result: Patient presented with mandibular partial edentulism Kennedy class II mod 1 and no experience wearing an RPD. An Implant-supported RPD treatment plan was recommended to improve the prognosis. RPD design and enamel modification were completed. CBCT of the patient wearing a trial removable partial denture was obtained for implant planning. The Implant planning software Codiagnostix (Dentalwings, Montreal, Canada) was used to import the DICOM files received from CBCT. With limited restorative space and the patient's anatomical challenges, the implant position was planned according to the most ideal prosthetic space with safety margin from anatomical landmark. Due to limited restorative space, the RPD framework and implant position were designed together using CAD/CAM software, and #19 implant placement and metal framework try-in were done simultaneously. The definitive prosthesis was delivered. The final prosthesis intraoral scan was done and superimposed in software to demonstrate the careful space planning of implant supported RPD using digital technology. Conclusion: This case report demonstrated that digital technology is beneficial in implant planning and restorative space evaluation for a predictable treatment outcome of implant-supported RPDs.

CC28 Merging Workflows to Fabricate Obturator Prosthesis in Limited Mouth Opening. M. THOMPSON, A. HERNANDEZ, C. YANG, V. DUTRA (Indiana University School of Dentistry)

Trismus is considered to be one of the common complications following radiation and post-surgical head and neck cancer treatment. Limited mouth opening not only impairs function but also affects the fabrication of maxillofacial obturators and prostheses. Additionally, treatment is made more complex by the presence of scar tissue, which is often found after a maxillectomy. This clinical report describes a patient who had undergone a hemimaxillectomy which required a combination of digital and conventional workflows to fabricate a maxillofacial obturator. The patient's severe trismus and bilateral scar band tissue presented a challenge in completely capturing the maxillofacial defect as well as areas of the maxilla near the scar band formation when making the conventional impression and intraoral scan. To fabricate the definitive master cast, a scan of a conventional impression was merged with an intraoral scan of the soft tissue. This was then merged with the volumetric data of the hard and soft tissues of the maxillary defect obtained from a CBCT. The STL file was used to a print a master cast on which a partial denture framework was designed and printed. This was then used to process the definitive obturator. Conclusion: The merging of digital and conventional workflows led to an accurate obturation of the maxillary defect in a patient with limited mouth opening.

CC29 Contemporary Fixed Implant-Assisted Management of Edentulous Arches. T. WANG*, D. MORTON, C.C. YANG, W.S. LIN. (Indiana University School of Dentistry)

Introduction: Rehabilitation of edentulous arches depends on numerous factors, including the arch, maxillomandibular relationship (MMR), anatomy, need for ridge modification, planned implant position, provisional restorations, space, esthetics and placement and loading protocols. This report presents treatment of an edentulous patient. The maxilla was managed conventionally with four implants and the Smart Denture protocol. The mandible was managed with four implants and an immediate prototype prosthesis. Reverse scan bodies were utilized to fabricate a second set of prototypes. Patient Treatment: The patient desired implant-assisted fixed prostheses to replace his failing dentition. Diagnostic complete dentures were delivered after his remaining teeth were extracted. A dual scan (CBCT) was obtained for planning ridge modification and the position of the implants. Surgical templates were digitally designed and fabricated to communicate ridge modification and implant location. For the mandible, four implants were placed after ridge reduction and a digitally designed fixed prototype immediately delivered. For the maxilla, four implants were placed and allowed to heal. The maxillary complete denture was converted to a fixed provisional prosthesis using the Smart Denture protocol. After one month, the MMR and tissues were captured with an IO scan and reverse scan bodies used to capture existing provisional prostheses. After data merging a second set of prototypes were designed, fabricated, and delivered. Results: The failing teeth were sequentially replaced with fixed provisional prostheses. Ridge modification and implant position were digitally planned and communicated. The Smart Denture protocol and conventional loading was utilized in the maxilla and an immediate digitally designed provisional provided for the mandible. Reverse scan bodies were used to capture data used to fabricate final prototype prostheses. Conclusion: Several pathways (contemporary and conventional) result in efficient and predictable management of edentulous arches. Outcomes relate to the quality of intervention. This patient is satisfied with all treatment.

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