Poster #1

Tumor-Associated Inflammatory Cells and Immune Checkpoint Inhibitors Expression in Oral Mucosal Premalignant Lesions

Flores-Hidalgo A, Aly FA, Steward-Tharp S, Padilla RJ

**Background:** Although oral mucosal transformation into oral cancer is not linear in its development, the general premise is that it begins as epithelial hyperplasia and progresses through dysplasia, with more severe dysplastic changes signifying more extensive genetic aberrations. Recent studies have shown that the nature of the tumor microenvironment and infiltrating immune cells can significantly modify the outcome of those aberrations. Although their role in cancer progression is not fully understood, these infiltrating cells have been strongly correlated with a poor or better prognosis for the patient in many solid tumors. In this study, we analyze the phenotypic expression of immune infiltrating cells in oral premalignant mucosal lesions and their utility in diagnosis of oral epithelial dysplasia (OED)

**Design:** Forty archived tissue samples were selected from East Carolina University and UNC Oral and Maxillofacial Pathology Laboratory. These included (n= 20) OLP and (n=20) with moderate to severe dysplasia. We used oral lichen planus (OLP) as an inflammatory model for this pilot study. Dual staining was carried out on each case with CD4/CD8, STAT1/CD163, and PD1/PDL1 antibodies. Automated histomorphometric digital analysis and multi-observer analysis were performed to detect inflammatory cells expressing the mentioned markers in the epithelial and connective tissue compartments. Follow-up information was retrieved from the patient's chart and correlated with our findings.

**Results:** STAT1/CD163+ macrophages were mainly found underlying the subepithelial compartment in OED. We previously reported that intraepithelial CD8+ lymphocyte distribution was strikingly different between OLP and moderate to severe OED. Our preliminary results show a correlation between STAT1+ and CD4+ cells in the connective tissue of OED lesions. An increased presence of intraepithelial PD1+ inflammatory cells in OED may also correlate with similar infiltration patterns of CD8+ cells and some STAT1/CD163+ macrophages.

**Conclusions:** Preliminary results of our study suggest that specific subsets of inflammatory cells in premalignant conditions could provide insight into pathogenesis and progression to malignancy. The presence of these cells may also be utilized as diagnostic markers to differentiate them from benign inflammatory conditions.

Poster #2

The Role of a Viral Protein in Covid-19 Blood Clotting.

Luckett D, Fuentes-Rivera N, Wright R, Anderson E

**Background:** SARS-CoV-2 is the virus responsible for a global pandemic due to its infectivity and severe symptoms. In addition to the typical respiratory symptoms, infection with COVID-19 has been shown to promote micro-clots within the blood vessels, and these clots are predicted to
Contribute to a number of the uniquely COVID-associated symptoms. Clot formation is a natural response to cellular damage within the vascular system and is facilitated by the release of a series of fiber-like structures known as Von Willebrand Factor (VWF). To prevent unnecessary clots from forming during vascular inflammation, an enzyme called ADAMTS-13 prevents the accumulation of VWF, in the absence of serious cell damage. **Objective:** The goal of our research is to determine if the SARS CoV-2 3CL protease, used in viral replication, promotes clotting during infection by targeting ADAMTS-13. **Methods:** The amino acid sequence of human ADAMTS-13 was evaluated for potential cut sites using published cleavage data from the SARS 3CL protease. Western blotting was used to directly evaluate interactions between ADAMTS-13 and purified COVID-19 3C protease. **Results:** *In silico* data identified 3 potential 3C protease cleavage sites in the ADAMTS-13 amino acid sequence. Western blotting confirmed cleavage of ADAMTS-13 in the presence of the SARS-CoV-2 3CL protease. **Conclusions:** Our current data demonstrate that a viral protein capable of cleaving ADAMTS-13 may be responsible for the reduced levels of ADAMTS-13 noted in COVID-19 patients that is linked to increased clot formation during infection. Additionally, this interaction may provide insights into the rebound symptoms observed with the anti-COVID drug Paxlovid, a 3CL protease inhibitor, and may provide clues to the nature of symptoms associated with long COVID.

**Poster #3**  
**Oral Microbiome Analysis after Resveratrol Treatment for Dental Caries**  
Navas Reis F, Afonso Rabelo Buzalaf M, Murata R  
**Objectives:** Improve our knowledge of the different types of microbial biofilms after treatment with rinses containing resveratrol, fluoride, or their combination by performing a comprehensive 16S rDNA profiling of the dental plaque microbiome. **Methods:** A triple-blind randomized crossover study was carried out with the participation of 12 volunteers after approval by the ethics committee in research with human beings of Bauru School of Dentistry, University of São Paulo. The volunteers were randomly assigned to 4 groups of treatment, according to the rinse solution. Supragingival plaque samples were collected using a sterile Gracey curette and immersed in RNAlaterTM Stabilization Solution. DNA quantity was assessed using a Qubit fluorimeter. Bacterial DNA was amplified using a nested PCR (LongAmp Hot Start Taq) with the Oxford Nanopore universal tag. Nucleic acids were concentrated using AMPure XP beads and 16S DNA libraries were prepared using the 16S Barcoding Kit SQK-165024 (Oxford Nanopore Technologies). DNA libraries were loaded onto FLO-MIN106 flow cells, and sequencing will be performed on a MinION Mk1B for ~36 hours with high-accuracy base-calling enabled using the MinKNOW software. Microbial identification will be carried out using EPI2ME WIMP package analysis tool. **Results:** We will investigate the biofilm microbiome using the Nanopore MinION sequencing platform (Oxford Nanopore Technologies, Oxford, UK) to gain additional insight into the microbial biofilm formed after applying different treatments. **Conclusions:** Although Resveratrol has been extensively studied by several researchers and its effects on human health have been satisfactory, most of this research was done in vitro, lacking real evidence. In conclusion, this in vivo study is essential to prove Resveratrol's effectiveness in humans, especially in the dental field.

**Poster #4**  
**Protective Arm of Renin-Angiotensin System Is Compromised in High Blood Pressure – A Closer Look at Long-term Control of Hypertension**  
Swami Vetha B, Byrum R, Azeez Aileru A
Introduction: Hypertension is a polygenic condition leading to cardiovascular complications, kidney failure and cerebral damage. The (mRen2)27 transgenic rat model of hypertension is characterized by overexpression of mouse Ren-2 gene mediated by renin-angiotensin-system (RAS) axis and exaggerated sympathetic nerve activity (SNA). Exogenously applied angiotensin II (AngII) on the superior cervical ganglion (SCG) evoked ganglionic compound action potential (CAP) and ganglionic long-term potentiation (gLTP). Objective: Present study determines the efficacy of ganglionic SNA and the effect of RAS components in hypertension. Methods: Extracellular recording of SCG revealed that AngII peptide exaggerated postganglionic transmission dose-dependently in hypertensive transgenic model and were abolished by angiotensin receptor blocker (ARB), suggesting postganglionic AngII subtype-1 (AT$_1$R) receptor localization and mediation. Receptor analysis and mRNA profiles also showed there is an imbalance of the angiotensin receptors (AT$_{1}$R, AT$_{2}$R and MAS) and reactive oxygen species marker, nicotinamide adenine dinucleotide phosphate oxidase 4 (NOX4) proteins in the ganglionic transmission.

Results: Receptor density for AT$_1$R is similar, and the qRT-PCR revealed it is consistent with the protein profile in (mRen2)27 animals. Further, immunocytochemistry (ICC) analysis showed a similar AT$_1$R receptor distribution and signals. However, assessment of subtype-2 (AT$_2$R), MAS and NOX4 specific proteins, showed that AT$_2$R receptor protein expression was four-fold lower and consistent with a low mRNA profile. MAS receptor expression was ten-fold lower and NOX4 protein was two-fold lower. The significant decline in components of the protective arm of RAS at the sympathetic ganglia demonstrated a differential ganglionic sensitivity to AngII despite similarity in the densities of AT$_1$R receptor profile.

Conclusion: We speculate that the significant reduction in AT$_2$, MAS and NOX4 protein expressions play an indirect role in the efficacy of gLTP and in the maintenance of high blood pressure.

Poster #5
What Is the Myocardial Implication in RAAS-regulated Hypertension? – A Closer Look at the NKA, NCX and Ca$^{2+}$ Reuptake Machinery in the Left Ventricular Myocytes
Byrum R, Swami Vetha B, Aileru A

Introduction: Renin Angiotensin-Aldosterone System (RAAS), a hormonal system that regulates fluid retention, sodium-potassium, volume homeostasis and blood pressure. Objective: The present study characterizes circulation of RAAS in (mRen2)27 transgenic model of hypertension, to understand the machinery for cardiac excitation-contraction coupling and arrhythmias in RAAS-regulated high blood pressure. Methods: Analysis of cardiomyocytes showed imbalance in the expression of RAAS receptors (AT$_{1}$R, AT$_{2}$R and MAS), Na$^+$/K$^+$ ATPase (NKA) pump, Na$^+$/Ca$^{2+}$ exchanger (NCX) system and alteration of intracellular Ca$^{2+}$. Results: Protein expression for AT$_{1}$R, AT$_{2}$R and Ang1-7-mediated-MAS receptors were significantly reduced in the cardiomyocytes of (mRen2)27. The relevant roles of NKA and NCX in Na$^+$ homeostasis was hypothesized that an increase in NKA isoforms ($\alpha$1 & $\alpha$2) would suggest a surge in the NCX exchanger to maintain Na$^+$ influx in cardiomyocytes. The protein expression of the NKA isoforms in the left ventricular myocytes suggests a two-fold increase in (mRen2)27. Further, RT-PCR showed that there is a decrease in mRNA profile for sarcoplasmic reticulum Ca$^{2+}$-ATPase (SERCA Atp2$\alpha$-2), suggesting a decrease in the slow twitch of Ca$^{2+}$ reuptake in sarcoplasmic reticulum which results in an increased intracellular Ca$^{2+}$ and cardiac excitation-contraction coupling in the hypertensive rodents. Conclusion: The data suggests that the optimum role of NKA, NCX and SERCA, in handling of Na$^+$ and Ca$^{2+}$ in ventricular myocytes, is different in RAAS-induced hypertension.
Poster #6
Crosstalk between the Rho and Rab family of small GTPases in neurodegenerative disorders
Nik Akhtar S, Bunner W, Brennan E, Lu Q, Szatmari E
Neurodegeneration is associated with defects in cytoskeletal dynamics and dysfunctions of the vesicular trafficking and sorting systems. In the last few decades, studies have demonstrated that the key regulators of cytoskeletal dynamics are proteins from the Rho family GTPases, meanwhile the central hub for vesicle sorting and transport between target membranes is the Rab family of GTPases. In this regard, the role of Rho and Rab GTPases in the induction and maintenance of distinct functional and morphological neuronal domains (such as dendrites and axons) has been extensively studied. Several members belonging to these two families of proteins have been associated with many neurodegenerative disorders ranging from dementia to motor neuron degeneration. In this analysis, we attempt to present a brief review of the potential crosstalk between the Rab and Rho family members in neurodegenerative pathologies such as Alzheimer’s disease (AD), Parkinson’s disease (PD), Huntington disease, and amyotrophic lateral sclerosis (ALS).

Poster #7
Behavioral and transcriptome profiling of heterozygous Rab10 knockout mice
A central question in the field of aging research is to identify the cellular and molecular basis of neuroresilience. One potential candidate is the small GTPase, Rab10. Downregulation and inhibition of Rab10 retain normal cognitive function and prevent dementia (“cognitive resilience”). Here we used Rab10<sup>+/−</sup> mice to investigate the molecular mechanisms underlying Rab10-mediated neuroresilience. We found that physical attributes and brain morphology are normal in Rab10<sup>+/−</sup> mice compared to their Rab10<sup>+/+</sup> littermates. Brain expression analysis of 880 genes involved in neurodegeneration showed that Rab10<sup>+/−</sup> mice have higher activation scores of pathways associated with neuronal metabolism, structural integrity, neurotransmission, and neuroplasticity compared to their Rab10<sup>+/+</sup> littermates. Lower activation scores were observed for pathways involved in neuroinflammation and aging. Moreover, we identified and validated several differentially expressed genes (DEGs) including Stx2, Stx1b, Vegfa, Lrrc25 (downregulated); and Prkca2, Syt4 and Grin2d (upregulated). Finally, behavioral characterizations showed that Rab10<sup>+/−</sup> mice performed better in a hippocampal-dependent spatial task (object in place test), while their performance in a classical conditioning task (trace eyeblink conditioning, TECC) was significantly impaired. Therefore, our findings indicate that Rab10 differentially controls the brain circuitry of hippocampal-dependent spatial memory and higher-order behavior that requires intact cortex-hippocampal circuitry. Transcriptomic and biochemical characterization of these mice strongly suggest that glutamate ionotropic receptor NMDA type subunit 2D (Grin2D or GluN2D) is a potential mediator of Rab10<sup>+/−</sup> behavioral phenotypes. We conclude that Rab10<sup>+/−</sup> mice described here can be a valuable tool to study the mechanisms of resilience in Alzheimer’s disease model mice and to identify novel therapeutical targets to prevent cognitive decline associated with normal and pathological aging.

Poster #8
Syzygium aromaticum Essential Oil and Its Major Constituent’s Antifungal Activity
Guimaraes Silva Vasconcelos P, Abuna G, Melo de Brito Costa EM Murata R
Objective: To evaluate the in vitro antifungal activity of Syzygium aromaticum essential oil and its major constituent’s eugenol and B-cariofilene. Methods: Initially, Minimal Inhibitory (MIC) and Fungicidal (MFC) Concentrations were determined for albicans (ATCC 321182, ATCC 90028, ATCC
MYA 2876, and ATCC MYA 274) and non-albicans Candida species (C. tropicalis ATCC 750, C. dublinienses ATCC MYA 646, and C. glabrata ATCC MYA 275). Based on MIC values, concentrations were defined for time kill assay and antibiofilm activity, S. aromaticum essential oil was used at MIC - 500 µg/mL, 5xMIC - 2500 µg/mL and 10xMIC - 5000 µg/mL, and eugenol at MIC - 1000 µg/mL, 5xMIC - 5000 µg/mL and 10xMIC - 10000 µg/mL. Time-kill assessed growth kinetics based on predetermined time points (0, 1, 2, 4, and 24 h). And finally, both compounds were evaluated regarding their capacity to inhibit biofilm formation and to act against a mature biofilm of C. albicans. Results: S. aromaticum essential oil and eugenol presented antifungal activity against albicans and non-albicans Candida strains (MIC 500-1000 µg/mL, MFC 1000-2000 µg/mL), B-cariofilene, however, did not show antifungal activity up to 8000 µg/mL of concentration. Time-kill assay showed that S. aromaticum essential oil and eugenol, both at 5 and 10xMIC, had substantially lower yeast growth from 1 hour time when compared to the negative control. All tested concentrations of S. aromaticum essential oil and eugenol were capable of statistically reduce fungal viability during biofilm formation. Regarding mature biofilms, only the concentrations equivalents to 5xMIC and 10xMIC could statistically reduce the yeast load in comparison to the vehicle control group (0.1% DMSO), this pattern was observed for both S. aromaticum essential oil and eugenol. Conclusion: Syzygium aromaticum essential oil and eugenol shows an antifungal activity, affecting Candida cell growth kinetics, and biofilm viability.

Poster #9
Assessment of the Antifungal Activity of Geraniol, Citronellal, and Linalool
Lee K, Guimaraes Silva Vasconcelos P, Abuna G, Melo de Brito Costa E, Murata R
Objective: To evaluate the in vitro antifungal activity of geraniol, citronellal, and linalool.
Methods: Antifungal activity was evaluated through the microdilution method to define Minimal Inhibitory (MIC) and Fungicidal (MFC) concentrations against Candida albicans (ATCC 321182, ATCC 90028, ATCC MYA 2876, and ATCC MYA 274) and Non-albicans Candida species (C. tropicalis ATCC 750, C. dublinienses ATCC MYA 646, and C. glabrata ATCC MYA 275). The compounds were also evaluated regarding their capacity to both inhibit biofilm formation and to act against a mature biofilm, thus a 72-hour biofilm of C. albicans was formed and antibiofilm activity was determined by Colony Forming Units, per milliliter and normalized by the biofilm biomass assessment (CFU/mL/g of dry weight). Geraniol was used at 5, and 50 mM/mL (MIC and 10xMIC), citronellal at 200 mM/mL (MIC), and linalool at 50 and 500 mM/mL (MIC and 10xMIC).
Results: Geraniol (MIC 1.25-5 mM/mL, MFC 10-20 mM/mL) presented antifungal activity against all strains tested with lower MIC and MFC values when compared to linalool (MIC 25-100 mM/mL, MFC 25-100 mM/mL) and citronellal (MIC 100-200 mM/mL, MFC 200 mM/mL). Both tested concentrations of geraniol, 5 and 50 mM/mL, showed a significant (p<0.05) activity against the biofilm of C. albicans – ATCC MYA 2876, being able to reduce the mature biofilm CFU/mL/g of dry weight count, as well as to inhibit biofilm formation. Linalool 500 mM/mL was the only concentration that significantly reduced biofilm viability, and antibiofilm activity was not significant for citronellal. Conclusion: Geraniol showed antifungal activity and reduced biofilm viability at lower concentrations when compared to citronellal and linalool.

CLINICAL RESEARCH

Poster #10
Determine Accuracy of Implant Treatment Planning with CBCT
Jolicoeur H, Camargo G, Stephenson T, Zhang W
**Objective:** Implants are widely used to replace missing teeth and cone beam computed tomography (CBCT) is the recommended imaging for implant treatment planning. It is important to evaluate how accurate CBCT based implant treatment planning is. However, not many studies have been conducted in the area. The objective of the study is to correlate the projected implant sizes based on the CBCT alveolar ridge measurements with the actual sizes of implants placed, to determine the accuracy of CBCT related implant treatment planning. **Methods:** CBCT scans taken from 2017-2022 at East Carolina University School of Dental Medicine were screened and cases for implant placement were included. The measurements for the heights and widths of edentulous ridges were collected from CBCT reports, and the data on actual implant sizes were extracted from Axium. The sites for central incisor, canine, 1st premolar and 1st molar of maxilla and mandible were analyzed. One-way analysis of variance was run to determine the average sizes for alveolar ridges/implants, and Pearson correlation analysis was conducted to determine the accuracy of CBCT based implant treatment planning. **Results:** A total of 544 cases were analyzed, with males 288, females 256, and an age range of 19-86 years old. The patients were predominately Caucasians. In average, implants had diameters of 4.17±0.38 mm and lengths of 10.05±1.17 mm, and alveolar widths and heights were 3.74 and 4.31 mm larger than implant diameters and lengths, respectively. Of the analyzed locations, implants placed at mandibular canine & first molar and maxillary first premolar demonstrated significant correlations with the sizes of the edentulous ridges (P< 0.05). **Conclusions:** CBCT based alveolar ridge measurements have been demonstrated as reliable parameters to predict implant sizes. However, its accuracy may be limited by anatomic factors, such as angle of edentulous ridges and proximity to vital anatomic landmarks.

**Poster #11**

**Pregnant Women’s Oral Health as a Predictor of Cardiometabolic Disease during Pregnancy**

Pendry E, Pasetto S, Murata R, May L, Pardi V

**Objectives:** The aim of this research project is to determine the association of maternal saliva, gingival crevicular fluid (GCF), and blood inflammatory markers, on the development of cardiometabolic disease during pregnancy. The hypothesis of this study is that high concentration of inflammatory markers in saliva, GCF, and blood, will be associated with the development of hypertensive disorder of pregnancy. **Methods:** In this study, we will recruit pregnant women <12 weeks of pregnancy from the ECU Ob/Gyn clinics and follow them until delivery. We will collect saliva, GCF, and blood at enrollment and at 12, 16, 20, 24, 28 and 36 weeks of gestation. Volunteers will receive an oral exam at enrollment, 28 and 36 weeks. We will evaluate inflammatory markers from saliva, GCF and blood during the pregnancy via Multiplex Luminex assays. The participants will also complete questionnaires at baseline using REDCap: 1) sociodemographic information (age at enrollment, race/ethnicity, number of children, highest education level achieved, household income, marital status, last dentist visit and reason), and 2) Oral Health Impact Profile (OHIP-14). Data from electronic health records regarding medical/dental history, and pregnancy outcomes will be collected after the delivery. **Statistics:** Differences in inflammatory markers of saliva, GCF, and blood between pregnancies with HDP and healthy pregnancies will be assessed via t-test. Pearson correlations will assess any associations between high concentration of inflammatory markers in saliva, GCF, and blood, will be associated with the development of hypertensive disorder of pregnancy. **Conclusion:** The findings of this project will help determine early markers to detect hypertensive disorders of pregnancy and provide earlier treatments to improve outcomes for mother and child.
Poster #12
Retrospective Analysis of Perforations Occurring During Endodontic Treatment: Incidence and Outcomes
Vyas R, Williams B, Schnoor Z, Lindauer P

Objective: 1) Determine the incidence of perforations during nonsurgical endodontic procedures and 2) survival rate for teeth having a perforation; and 3) determine if a protocol introduced in July 2019 reduced perforations. Methods: A retrospective data analysis from electronic dental records in a dental school practice was performed. The database was searched for nonsurgical endodontic procedures between January 2011 and September 2022. Inclusion criteria included: any patient undergoing a nonsurgical endodontic procedure, follow up exam or odontogram, subsequent endodontic therapy, perforation repair or extraction code for the treated tooth. Cases were defined as those patients with a perforation occurrence during a nonsurgical endodontic procedure. Tooth survival was defined as an asymptomatic, functioning tooth post-perforation. The final cohort included 53 cases; four teeth were excluded from survival analysis because the patients left the practice immediately after endodontic treatment was completed. Results: 7098 patients met inclusion criteria. The study group included 28 female and 25 male patients between the ages of 12 and 79 years. Perforation incidence was 0.75%. Perforations occurred in 10 anterior and 43 posterior teeth. The difference in the proportion of perforated teeth between anterior and posterior teeth was significant (p=0.001). The introduction of a perforation reduction protocol resulted in a statistically significant decrease in perforations p=0.0066. Kaplan-Meier survival curves showed mean survival rates of 2326 days for student cases and 2191 days for resident cases. Conclusion: Retrospective analysis of extant data from an academic dental setting revealed a 0.75% incidence of perforation during endodontic treatment. No statistically significant difference in tooth survival was noted among different provider groups. This new protocol significantly reduced the incidence of perforations.

Poster #13
Role of Hyaluronic Acid in the Treatment of Periodontitis as Seen through Clinical Trials
Ravindra S, Bloss J, Geraldie S

Objectives: The use of hyaluronic acid (HA) can help alleviate periodontitis through procedures including scaling and root planing, oral hygiene, and nutritional counseling as well as osseous surgery and bone and tissue grafting respectively. The objective of this short literature review is to collect information on how HA has been applied or used in clinical trials. Methods: All published studies were searched for in MEDLINE via PubMed using the following keywords: ("endodontics"[mesh] OR endodontic*[tiab] OR endontology[tiab] OR "periodontics"[mesh] OR periodontic*[tiab] OR periodontology[tiab] OR periodontal[tiab]) AND ("Hyaluronic Acid"[mesh] OR "Hyaluronic Acid"[tiab] OR "Amo Vitrax"[tiab] OR Biolon[tiab] OR Etamucine[tiab] OR Hyaluronan[tiab] OR Hyvisc[tiab] OR Luronit[tiab] OR "Sodium Hyaluronate"[tiab] OR "Hyaluronate Sodium"[tiab] OR Amvisc[tiab] OR Healon[tiab]). Out of 237 articles, we could find three articles that used HA in clinical trials and fit the selection criteria. Results: In the first article, hyaluranon-containing mouthwashes were proven to be comparable to chlorhexidine, the gold standard when examining periodontitis in combating dental caries, gingivitis, periodontitis, and oral soft tissue disease. This clinical trial examines the comparability of hyaluranon-based mouthwashes to chlorhexidine-based mouthwashes as it has significantly less side effects and can be used long term. By increasing the concentration of hyaluronan, the main oral pathogens can be limited. The second examines how patients with gingivitis responded to 0.2% HA gel adjunct and showed improvements within the Gingival Index and Bleeding Index at 6th and 12th week comparisons. The third investigated how postoperative scaling and root planing patients’
response was to 0.8% hyaluronic acid gel. This trial concluded that patients with chronic periodontitis could be helped significantly using the 0.8% HA gel. **Conclusions:** The use of HA can improve wound healing and reduce inflammation in patients undergoing surgical and non-surgical periodontal treatment and may be a substitute for chlorhexidine.

**Poster #14**  
**SDF-treated Lesion Outcomes Among GA Waitlisted Pediatric Patients**  
Oxendine R, Kordis A, Carmargo G  
**Purpose:** This study evaluated the outcomes of SDF application on carious lesions in general anesthesia waitlisted pediatric patients awaiting full-mouth dental rehabilitation. **Methods:** A retrospective axiUm chart review using CDT codes was conducted to compare differences in the cumulative incidence of dental emergencies of pediatric dental patients, less than or equal to 10 years of age, waitlisted for dental treatment under general anesthesia between January 1, 2017 - April 30, 2022. Outcomes measured were restorations and extractions in SDF-treated teeth compared to untreated teeth. **Results:** This study reviewed data for 3442 teeth in 469 patients. Of those reviewed, 567 teeth, or 16%, were treated with SDF, whereas 2875, or 84%, did not receive an SDF application. SDF-treated teeth resulted in 434 restorations, 76%, and 109 extractions, 19%. Non-SDF treated teeth received 2182 restorations, 76%, and 518 extractions, 18%. Extractions at the emergency visit and general anesthesia visit for the SDF group, 17% and 16% respectively, compared to the non-SDF group, 83% and 84% respectively, yielded no statistical difference (P=.25). Statistical significance (P=.0003) was found for the mean days to restoration between the non-SDF (184.1) and SDF (206.9) treated teeth. The difference in mean days to extraction for non-SDF and SDF treated teeth, 221.6 and 286.4 respectively, was statistically significant (P<.0001). Tooth outcomes of SDF treated teeth were not statistically significant for restorations (P=.74), extraction (P=.49), and teeth seen at an emergency visit (P=.30). **Conclusions:** Caries arresting medicament application did not lead to statistically significant differences in tooth outcomes regarding treatment options, restoration, or extraction.

**Poster #15**  
**The Dangers of Nitrous Oxide Administration in Patients with Cyanocobalamin (B12) Deficiency: A Systematic Review of Medical Literature**  
Eleidy S, Thompson S, Bloss J  
**Background:** This review was conducted to investigate the association between nitrous oxide and cyanocobalamin (B12) deficiency, and the dangers of administering nitrous oxide to patients who may have unrecognized vitamin B12 deficiency. **Methods:** A comprehensive search of electronic databases including PubMed, Science Direct, *JAMA Internal Medicine*, ASA Publications, NIH, Semantic Scholar, Wiley, the *American Journal of Clinical Nutrition*, and the *BMJ* was performed. Subgroup analyses were also performed to explore the source of heterogeneity. **Results:** The search retrieved 219 reports. Fifty-two were included in the final analysis, including eleven case reports. The included studies were primarily concerned with raising awareness of the apparently increasing use and subsequently increasing harms of N.O. in patients with B12 deficiency. There was limited reference to regulation of nitrous oxide exposure in the published studies, no suggestions for harm reduction strategies or application of service level responses. In general, there is a lack of awareness of N.O.-related harms in cyanocobalamin deficient patients. **Discussion:** The existing literature presents several case reports of subacute combined degeneration in patients with a pre-operative diagnosis of macrocytic anemia, or in cases of undiagnosed atrophic gastritis or pernicious anemia. In many of these cases, the measured cyanocobalamin levels are borderline or normal, indicating that serum levels are not always
determinant of a deficiency. For dental providers, it is recommended that bloodwork be performed prior to the use of N.O. when treating patients with the aforementioned risk factors or those in populations where cyanocobalamin deficiency could be present. Elevated serum methylmalonic acid is the most specific marker that indicates cyanocobalamin deficiency and should be used in conjunction with risk factors and clinical presentation to determine a patient’s risk for post-operative neurologic complication.

Poster #16
The Influence of Orthodontic Appliances on MRI of the Velopharynx
Pua Schleif E, McCarlie Jr V, Fang X, Briley P, Perry J

Objectives: The purpose of this study is to evaluate the influence of common pediatric orthodontic appliances on velopharyngeal MRI. Magnetic resonance imaging (MRI) is becoming increasingly valuable among cleft palate craniofacial teams in patients with velopharyngeal insufficiency (VPI). One complication to the growing use of MRI among the cleft population is the presence of orthodontic appliances, which may result in image distortions and non-interpretablility of MR images. This is particularly a challenge because individuals with cleft anatomy have a higher incidence of dental anomalies compared to the non-cleft population (Bohn, 1963; Jordan et al., 1966; Schroeder & Green, 1975; Ribeiro et al., 2003; Marzouk et al., 2020). Currently, it is not known which orthodontic appliances and materials interfere with the ability to visualize the velopharyngeal (VP) structures during an MRI. The purpose of this study is to evaluate the influence of common pediatric orthodontic appliances on VP MRI. Insights from this study will be useful in determining which patients undergoing orthodontic treatment are candidates for VP MRI.

Methods/Description: Nineteen participants (6 females, 13 males) ages 11-18, undergoing orthodontic treatment, were recruited. All participants were scanned in a 1.5-Tesla Siemens MRI machine in supine position, capturing 3D and 2D images at rest and during sustained phonation. Two raters experienced in performing MRI evaluations of the velopharynx examined the MRI for distortion in 8 anatomical sites of interest. Results: Analysis with data collected thus far suggest that a single-shot technique using Half-Fourier Acquisition Single-shot Turbo spin echo (HASTE) results in less distortion compared with a multi-shot imaging technique using a fast spin-echo (FSE). Conclusion: The presence of orthodontic appliances does not hinder visualization of all velopharyngeal structures during an MRI. The results of this study will be useful in determining which patients undergoing orthodontic treatment are candidates for VP MRI.

Poster #17
Post-insertion Complications of Digital Complete Denture Systems: A Literature Review
Senkumar L, Giugliano T, Choi M

Introduction: Complete edentulism is a debilitating condition because it affects the oral health and quality of life. There are two methods of fabricating complete dentures. The conventional protocol involves a complex sequence of multiple clinical and laboratory steps averaging a minimum of five clinical appointments. Digital dentures have gained popularity because it requires reduced number of clinical appointments without compromising the overall quality of the final prosthesis. The most familiar companies manufacturing digital dentures are AvaDent, Dentca and Ivoclar Vivadent. Objective: The objective of this poster is to provide a literature review of the post-insertion complications associated with digital dentures. Material and Methods: An electronic search was conducted using PubMed/MEDLINE, Cochrane, and ResearchGate databases from 2000 to 2022. The search was performed using keywords “digital dentures complications”, “CAD/CAM dentures complications”, “computer-engineered complete denture complications”. Inclusion criteria for selection were articles written in English and articles
that investigated complications of digital dentures. Exclusion criteria included any articles that failed to meet the inclusion criteria. 6 articles that assessed post-insertion complications of digital dentures were selected. **Results:** One systematic review concluded that overall patient dissatisfaction (25.49%), inadequate retention (20.73%) and inadequate esthetics (15.09%) were the most common complications associated with digital dentures. **Conclusions:** The accuracy of digital complete dentures is influenced by the fabrication technique and different CAD/CAM systems. One of the advantages of the CAD/CAM dentures is the inclusion of trial denture appointment that could significantly reduce the post-insertion complications. Digital dentures are considered a viable option to treat completely edentulous patients. However, more studies need to be done to evaluate the post-insertion complications of digital denture systems.

**CLINICAL CASE STUDIES AND SERIES**

**Poster #18**  
**Functional and Esthetic Improvements of Class III Malocclusion Using Conservative Approaches.**  
**Case Report**  
Elgendy H, McCarlie WV  
**Objectives:** Occlusal discrepancies and moderate dental and facial deformities in adults usually require treatment combined with orthodontics and restorative approaches to achieve optimal, stable, functional, and esthetic results. The aim of the present case report is to describe the orthodontic-restorative treatment of a 24-year-old male patient with a Class III malocclusion and poor facial esthetics.  
**Materials and Methods:** This male patient presented to the clinic with a chief complaint of anterior crossbite presented with a skeletal Class III relationship, a slightly less than average mandibular plane angle (SN-\(\text{MP}\), 28.3), proclined maxillary incisors (U1-SN, 114.6) and reclined mandibular incisors (L1-MP, 85.9). Both upper and lower lips were in front of the E-plane. Nasolabial angle is acute (74.2). Facial asymmetry noted with right half larger than the left. Dental midlines not coincident with facial midline and dental arch asymmetry noted. Class III malocclusion, subdivision right with anterior crossbite. Negative overjet (-3.0) and overbite (4.1) were excessive. A severe curve of Spee was also noted. A tooth size discrepancy and anomalous morphology was noted in maxillary incisors. **Results:** After treatment, achieved Class I occlusion, improved interincisal angle, with positive overjet and decreased overbite. The curve of Spee was leveled and restorative work was accomplished by using composite veneers to change the maxillary incisor proportions. **Conclusions:** An effective and stable correction of the Class III malocclusion was achieved, with substantial enhancement of facial balance, symmetry, and proportion in this patient, with orthodontic therapy and a conservative restorative approach.

**Poster #19**  
**Management Of Compromised Inter-Tooth Space in The Esthetics Zone with Conservative Approach.**  
Vasa S, Abdelaal M, Elgendy H, Sheba M, Gillone A, Martinez Luna A  
**Background:** Maxillary incisor agenesis, prominently the lateral incisor is the most common congenitally missing permanent tooth, in the anterior maxillary region, representing approximately 20% of all dental anomalies. Several options have been presented to treat patients with congenitally absent (or malformed) Lateral Incisors. Overall, the treatment of choice was shown to be essentially dependent on diagnostic parameters, length of treatment time, facial esthetics, and age of patient. This case report will demonstrate a young individual presenting for the replacement of maxillary malformed and congenital missing lateral incisors. **Case Description:** 26-year-old male patient presented to the ECU SODM Comprehensive Care clinic with a peg lateral
#7 and an implant at #10 due to a congenitally missing lateral. Patient had an existing Nobel Biocare Nobel Active 3.0mm x 11.5 mm implant at the site of #10. Due to limited interdental space, at time of initial appointment there was not enough space for a normal sized #10 crown. In order to make room, the adjacent teeth would have to be stripped. Study models were collected, and clinical photographs were used to fabricate a wax up of teeth #6-11. The patient returned to the clinic for a mockup presentation of the design and images were obtained. After digital smile design, were able to distribute the spaces, and create a balance with porcelain crown on #7 and 10. Conclusions: Loss of anterior teeth accompanied by congenitally missing anterior teeth presents a challenging conquest in terms of prosthodontic rehabilitation. The management of compromised inter-tooth spaces presents a challenge for the contemporary dental implant team. Proper placement procedures and restorative techniques can lead to very esthetic results, allowing for natural tissue contours and emergence profile formation reminiscent of the natural tooth.

Poster #20
Use of Custom Anatomic Healing Abutments: A Case Report
Blackstock M, Sheba M, Elgendy H, Gillone A, Vidal A, Martinez Luna A
Objective: The focus of implant success criteria has shifted from implant survival to the creation of life-like implant restorations with natural-looking peri-implant soft tissues. As part of this treatment process, the use of customized healing abutments has been implemented with the purpose of contouring the soft tissues and creating a natural emergence profile that would allow for an esthetic and functional implant restoration. Material and Methods: A 47-year-old healthy female patient presented to the University of East Carolina School of Dental Medicine clinic for implant treatment to replace tooth #5. A maxillary CBCT was exposed, and an intraoral scan was obtained with Cerec Omnicam®. Data was imported into CoDiagnostix® software for planning and guide design. The customized healing abutment was designed and manufactured with PMMA on a titanium base abutment. Implant placement was completed using a fully guided protocol and a customized healing abutment was placed. Tissues healed well and the implant was restored with a ceramic crown. Results: The implant was placed in a restoratively driven position with a customized healing abutment that allowed to create an emergence profile through guided soft tissue healing from the day of implant surgery. Also, the custom healing abutment allowed for maintenance and support of the tissue for ideal restorative contours. Conclusion: The use of customized healing abutments allows the clinician to guide the soft tissue healing to facilitate the prosthetic procedures and obtain a restoration with adequate tissue contours and esthetics.

Poster #21
Sinus Floor Augmentation Using a Combination of Anorganic Bovine Bone with Demineralized Cortical Allograft Fibers or Granules: A Case Series.
Gillone A, Martinez Luna A, Paquette D
Objective: Augmentation of the maxillary sinus floor is a commonly used surgical procedure to increase bone volume prior to implant placement in the posterior maxilla. Various bone grafting materials (autogenous, allograft and xenograft) or bone substitutes have been used alone or in combination to achieve this goal. Method: We present a series of cases where a combination of cancellous anorganic bovine bone with either demineralized cortical allograft fibers or demineralized cortical allograft granules, was used for a staged or simultaneous implant placement approach. Subsequently, a porcine collagen membrane was used to cover the access window. The main benefits of using this mixture are the osteoinductive and osteoconductive properties of the demineralized allograft and xenograft material respectively. Furthermore, the
xenograft material helps in preserving the volume, with no inflammatory or adverse responses, while the demineralized allograft aids restoring vital bone at a faster rate. Finally, this combination avoids the need for an autogenous bone graft, hence decreasing morbidity. **Conclusion:** These cases demonstrate the clinical application of this combination as well as a successful outcome. Studies investigating the histological and ultrastructural properties are needed in the future.

**DENTAL AND BIOMATERIALS RESEARCH**

Poster #22

**Effect of H-10 on Dentin Bond Strength of Methacrylate-based adhesive**

Gillespie S, Hampton J, Geraldeli S

**Objective:** The purpose was to test the hypothesis that adding antibiofouling 2-aminoimidazole (H-10) small molecules into universal dental adhesives will maintain their flexural strength. **Methods:** Two commercially available dental adhesives, Clearfil Universal Bond Quick (CUBQ) and Amber APS (Amb), were selected to receive or not a subset of 2-AI small molecule family. One part H-10 (10 mM) that had been dissolved in dimethyl sulfoxide (DMSO) was mixed with ten parts of each adhesive to get a 1mM concentration of H10 in the adhesives. Bars for control (no H10) and experimental (with H10) were prepared by pouring the adhesive material into hydrogel mold (2 mm x 2 mm x 20 mm), covered with mylar matrix, and polymerized with 16 J/cm² of radiant exposure using an LED light curing unit. Each adhesive bar-shaped specimen was kept at room temperature for 24h before testing. Samples were tested for three-point bending flexural strength (FS) using a mechanical testing machine (ODEME 150) at a crosshead speed of 0.5 mm/min. The maximum load at fracture point was recorded and the $\sigma_f$ calculated using the following equation: $\sigma_f = 3FL/(2bh^2)$. Two-way ANOVA and Tukey test ($\alpha=0.05$) were used to analyze the data. **Results:** FS mean values were CUBQ: 9 MPa, CUBQ-H10: 8.5 MPa, Amb: 35 MPa, Amb: 25 MPa. There was no difference in FS between CUBQ and CUBQ-H10. However, there was a significant difference between Amb and Amb-H10 dental adhesives. **Conclusion:** The addition of a subset of the 2-AI small molecule family, H-10, to dental adhesive is material specific.

Poster #23

**Does the Localized Irradiance of Polywave LEDs Affect the Bonding Properties to Dentin?**


**Purpose:** The aim of this study was to evaluate the effect of wavelength range (violet 405nm vs blue 445 and 465 nm) emitted by a "poly-wave" LED curing-light on dentin microtensile bond strength (μTBS) of universal adhesives to dentin. **Methods:** Two hundred and twenty human molars were randomly assigned to 6 groups, according to the following variables: adhesive system (Ambar Universal APS [AMU], Scotchbond Universal Adhesive [SBU] and Tetric n-bond Universal [TUB]) vs. adhesive strategies (self-etch and etch-and-rinse mode). After exposing the mid-dentin and smear layer formation, each adhesive system was applied as per manufacture’s recommendation. During the light-curing procedure (Valo, 1400mW/cm²*10s), each quadrant of tooth corresponding to different wavelength range was demarked using a permanent marker of different colors. Three layers of resin-based composite material was added and individually polymerized with a radiant exposure of 14 J/cm² (Valo). Each restored tooth was sectioned into resin-dentin bonded sticks and tested for μTBS. The data was subjected to 3-way repeated measures ANOVA and Tukey’s test ($\alpha=5\%$). **Results:** For AMU and SBU, no significant differences were observed between different wavelength range ($p > 0.05$). However, for SBU, light-curing
with LED 405 violet showed lower µTBS when compared to other LEDs (445 and 465) \((p < 0.01)\). AMU showed better µTBS values in comparison with SBU \((p = 0.001)\). **Conclusions:** The wavelength range (violet 405nm vs blue 445 and 465 nm) emitted by a "poly-wave" LED curing-light affects the microtensile bond strength (µTBS) of universal adhesives to dentin. The bonding of universal dental adhesive to dentin is locally affected when universal adhesive based on the conventional camphorquinone/amine photoinitiator (Scotchbond Universal) was light-curing with poly-wave light curing units.

**Poster #24**

**Covalent Conjugation of 2-Hydroxyethyl Methacrylate with Anti-Biofouling 2-Aminoimidazole Small Molecules**

Hampton J, Allen W, Gerald J

**Purpose:** To conjugate the methacrylate, 2-hydroxylethylmethacrylate (HEMA), to a 2-aminoimidazole (2-AI) small molecule to explore the effects on bacterial inhibition, the polymer-network formation, and the effects of physical properties and tooth adhesion in hopes to limit secondary caries. **Methods:** A series of organic chemistry reactions was performed to produce a 2-aminoimidazole molecule that is capable of dispersing bacterial biofilms. This 2-AI will be subjected to 2-hydroxyethylmethacrylate (HEMA), a common methacrylate used in dental adhesives, in hopes to conjugate the two halves to form a photocrosslinkable methacrylate capable of dispersing biofilms within the oral cavity. **Results:** H-NMR spectra of the molecules throughout the process give way to the confirmation of each organic reaction. 2-AI motifs are confirmed through the integration of peaks at 7.1001 ppm for 0.7955 to resemble 1 hydrogen coming off the 5-membered ring. Additionally, the reduction of molecules from benzene rings to mere hydrogens to form carboxylic acids are prevalent in the NMR’s. This is prevalent by the peak integrated for 5.7427 at 7.3440 that disappears after hydrogenation. **Conclusion:** H-NMR spectra show the continuation and transformation of the small molecule between each step up until the 2-AI is formed. Currently, the lab has completed the successful procurement of the 2-AI motif and will attempt to conjugate with the methacrylate. These molecules will then be tested for their flexural strength, bacterial dispersion, and polymer network formation using IR spectroscopy.

**Poster #25**

**Investigating the impact of flow rate on blood clot structure and mechanical properties**

Sowers H, Hudson N, Vadati A

**Objectives:** Blood clots are vital to our survival, created by the body to halt life-threatening bleeding. While blood clotting is usually a life-saving mechanism, it can also become a life-endangering problem. Blood clots that are structurally weaker are more likely to break off and embolize. This embolus can travel through the body and cause numerous dangerous conditions including deep vein thrombosis, organ death, strokes, and heart attacks. Identifying which clots, based on their conditions of formation, are more likely to embolize could enable both prevention and treatment. **Methods:** Fibrin clots were created by mixing wild-type and ALEXA-488 labeled fibrinogen and thrombin to form fibrin, the structural component of blood clots. A pump was used to add the components to a microfluidic channel causing them to mix under flow. These channels were created by adhering PDMS onto a glass slide using heat. The channels had a notch to create turbulent flow and stimulate clot formation. The resulting clots were imaged using a Leica DMI 8 epifluorescent microscope. **Results:** The fibrin structure of clots was found to change depending on the flow conditions on which it was formed. Clots that were formed in a straight channel had aligned fibers contrasting clots formed in turbulent flow that had unaligned fibers. **Conclusions:** This phase of the project successfully provided the preliminary results for the larger focus of this
project: characterizing the mechanical properties of blood clots using nanoindentation testing. The next phase of the project will consist of mechanically testing them by an Optics 11 Piuma Nanoindenter to measure individual clot strength as a function of flow rate.

COMMUNITY AND POPULATION RESEARCH

Poster #26
The Resounding effect of COVID-19 on Dental Utilization, Payer Type, and Prophylaxis Code Frequency
Van Gurp R, Moss M, Wu Q, Al-Dajani M

Background: The initial diagnosis of COVID-19 emerged within the United States on January 20th, 2020. Since this date, the virus has taken ahold of the public health stage, with over 85 million cases recorded nationwide. Despite the installation of the SARS-CoV-2 vaccine in December of 2020, repercussions still continue to linger. Some of which include unemployment and loss of Employer-Sponsored Dental Insurance, which in turn, have statistically altered dental care utilization, with differing trends being displayed according to the state level impact of COVID-19. Aim Statement: The goal of this study is to demonstrate the pre-, during, and post COVID-19 patterns of three procedural level variables as they pertain to the underserved populations of North Carolina. These three variables include dental service utilization, payer type and Prophylaxis code frequency. Methods: A retrospective descriptive epidemiologic study design was performed to investigate the characteristics of dental visits in the East Carolina School of Dental Medicine (ECU SoDM) clinics and Community Service Learning Centers during three periods: Pre-COVID-19, during COVID-19 and post COVID-19. The data to be analyzed will be retrieved from the axiUm patient electronic dental records database at the ECU SoDM. This data will be dissected using IBM SPSS statistical software. Results: From this analysis, it was shown that self-payment remained the most common methodology of payment throughout all three periods. In terms of frequency however, self-pay decreased from pre-COVID (32,939) to post-COVID (28,295) by approximately 4,644. Both Grant funding and Medicaid also followed this decreasing trend. Private Insurance was the only form of payment that showed an increase post-pandemic (11,965 to 15,481). With regards to dental utilization, the most common procedure type was diagnostic (64,535), followed by Preventive (32,773) and Restorative (21,320) across all three timeframes. Finally, it was also observed that there was a significant decrease in Prophylaxis code frequency during the 4-month pandemic timeframe. However, this frequency rebounded quickly at the start of the post-COVID period. Conclusion: COVID-19 has had a resounding effect on dental utilization as a whole. Dental visit patterns are showing signs of gradual rebound as the pandemic continues to evolve in its midst.

Poster #27
Knowledge That School Nurses Possess to Effectively Care for Traumatic Dental Injuries
Ferguson C, Webb M, Acosta-Rodriguez K, Moss

Objectives: Multiple studies explore the prevention and management of traumatic dental injuries, but few pertain to the knowledge that school nurses possess to identify and manage these injuries. The purpose of this study is to assess the knowledge that school nurses in North Carolina possess to effectively care for dental trauma. Methods: A survey was distributed to school nurses by the School Nurse Association of North Carolina via email and posted to the internal forum for members. The survey obtained demographic information and assessed the level of knowledge to appropriately identify and care for four dental trauma cases. Results: This study revealed that school nurses identified over 50% of traumatic dental injuries and their management. The dental
trauma with the prognosis that depends the most on timely treatment is an avulsion. However, only 53.3% of school nurses knew that reimplantation within the hour would lead to the highest success and 68.9% understood that immediate reimplantation would be ideal. 100% of nurses responded that both milk and Hank’s Balanced Salt Solution are suitable options to store the tooth in if reimplantation was not an option. **Conclusions:** A combined average of 68.65% of the traumatic dental injuries were correctly identified and a combined average of 66.18% were appropriately managed. A gap in this knowledge still exists. Due to the importance of timely treatment, it would be beneficial for school nurses to receive more information on this subject either through continuing education courses or through distribution of resources that are currently available.

**Poster #28**
**Impact of COVID-19 on Referral Outcomes at a Pediatric Dental Clinic in a Rural Academic Medical Center**
Yang B, Camargo G, Acosta-Rodriguez K, Moss M, Webb M
**Purpose:** The purpose of this study is to analyze the referrals from in-house pediatricians to the dental clinic to assess number of referrals, number of completed appointments, and compare these findings to the impact of COVID-19 from March 2020 to March 2022. **Methods:** Data was obtained retrospectively using electronic health record (axiUm). Referred patients between the ages of 0-5 years were identified from April 2017 to July 2022. The timeframe for the impact of COVID-19 was designated to March 2020 to March 2022. The following data points were collected and analyzed including date of referral, completion of the appointment, type of treatment, and demographics. The COVID-19 data was compared to pre-COVID-19 timeframe, April 2017 to April 2020. **Results:** Among 511 referrals received from the pediatricians between 2017 to 2022, 17% (88) have been documented to complete an appointment. Pre-COVID timeframe revealed 100 referrals and 66% (66) completed appointments. COVID timeframe revealed 411 referrals and 5% (22) completed appointments. Data was compared using Chi Square and Exact Measures of Association. **Conclusion:** Our pediatrician colleagues were able to provide virtual wellness visits during the pandemic, whereas the dental clinic was open for emergency visits only. Dentistry is also a procedure-based field and the ability to provide care virtually is limited. As we emerge from the pandemic, pediatric dental clinics may not have the capacity and staff to accommodate a surge of patient referrals from virtual visits and the return of their existing patients.

**Poster #29**
**Racial and Ethnic Disparities in Periodontal Health Not Related to Socioeconomic Status of Adults Seeking Dental Care**
**Background:** Population studies consistently demonstrate greater prevalence of chronic diseases, including oral diseases, among underrepresented minorities. The objectives of this retrospective study were to measure and describe the prevalence and extent of periodontitis among adults seeking dental care within an academic practice-based network in rural North Carolina. **Methods:** This study used deidentified electronic health record data from adult dentate patients (>30 years) of record (2011-2017) seeking dental care who received a comprehensive periodontal examination at one of nine networked clinical centers. Periodontitis prevalence was calculated using CDC/AAP case definitions, along with extent (%) scores for periodontal parameters. Comparisons focused on age, gender, race, ethnicity, tobacco use, diabetes status, payer or insurance status (as a surrogate for socioeconomic status), plaque scores, and number of teeth. **Results:** EHR data for 10,544 adult patients (60.5% female) indicated 79.8% having some form of
periodontitis. This patient population was diverse: 22.6% Black, 4.4% American Indians, and 53.8% Whites, with 4.8% self-identified as Hispanic. Patients 50 years and older showed greater mean extent scores for clinical attachment levels relative to patients 30-49 years. Males exhibited greater periodontitis than females (p=0.001). Blacks showed significantly (p<0.001) greater periodontitis prevalence relative to Whites. Hispanics also showed greater prevalence of periodontitis (p<0.001) relative to Non-Hispanics. Significantly greater periodontitis was also noted for tobacco users (p<0.001) but not for diabetes or payer status. A multiple logistic regression analysis of periodontitis prevalence confirmed significant associations for periodontitis for age, sex, race, ethnicity, tobacco use, high plaque scores, and number of teeth (p<0.001) but not diabetes or socioeconomic status. **Conclusions:** The data document that racial and ethnic inequalities in periodontal health occur within the population of adults residing in rural communities in North Carolina and seeking dental care.

**Poster #30**
**Periodontal Health Status among Young Adults (ages 20-29) in an Academic Care Setting**
Vidal A, Paquette D, Gillone A, Martinez Luna A, Moss M, Camargo G

**Background:** Throughout the years demographical studies have demonstrated greater prevalence of chronic diseases, including oral diseases, among underrepresented minorities. The objectives of this Comparative study are to measure and describe the prevalence and extent of periodontitis among young adults from ages 20 until 29 seeking dental care within an academic practice-based network (PBN) in rural North Carolina and compare the results with the previous study, to identify the dental care needs the young adults might require in these areas. **Methods:** This study used deidentified electronic health record (EHR) data from adult dentate patients (≥30 years) of record (2011-2017) seeking dental care who received a comprehensive periodontal examination at one of nine networked clinical centers. Periodontitis prevalence was calculated using CDC/AAP case definitions, along with extent (%) scores for periodontal parameters. Comparisons focused on age, gender, race, ethnicity, tobacco use, diabetes status, payer or insurance status, plaque scores, and number of teeth. **Results:** We will summarize the data in terms of prevalence and extent of periodontitis and make comparisons by racial/ethnic status and payer type.

**Poster #31**
**Jones County School-Based Oral Health Prevention Program**
Stewart R, Buck J, Pardi V, Webb M, Wright WG

**Objective:** To plan and implement a rural school-based oral health prevention program in eastern North Carolina. **Methods:** Twenty school districts of significant interest were evaluated based multiple factors, such as: total number of schools and students, percentage of economically disadvantaged students, poverty level, dentist to population ratio, regional kindergarten and third grade decay rates, the number of children sealed by Medicaid providers in the region, and proximity to an ECU dental clinic. **Results:** Districts evaluated ranged in size from two schools with 580 students to 36 schools with nearly 23,000 students. More than 90% of students in sixteen districts were considered economically disadvantaged and the poverty rate was greater than 20% for 11 districts. The dentist to population ratios ranged from 2090:1 to 13,690:1. Kindergarten and third grade decay rates were 9.8-24.1%. The number of children sealed by Medicaid providers ranged from less than 1,900 to over 10,000. Fourteen of the districts had an ECU School of Dental Medicine Community Service-Learning Center in the same or adjacent county. **Conclusions:** Multiple school districts in eastern North Carolina were an appropriate choice for a rural school-based oral health prevention program. Jones County was the best choice due to total number of
schools and students, the percentage of economically disadvantaged students, poverty level, dentist to population ratio, and regional kindergarten decay rate.

Poster #32
Oral Health Knowledge and Attitudes of Chatham County Elementary Educators
Hartung L, Pardi V

Objectives: Children are an incredibly vulnerable population when it comes to oral health and oral health preservation. Elementary school teachers play an integral role in the cultivation of certain beliefs, attitudes, and knowledge that children may have towards their oral health care and oral health routines. Ensuring adequate dental literacy and efficient oral health habits in elementary aged children is an integral step in moving towards more optimal oral health worldwide, because healthy habits tend to develop at a young age. The aim of the present project is to explore oral health attitudes, behaviors, knowledge, and the perception of elementary school teachers at Chatham County as oral health educators. Methods: This cross-sectional study will be conducted through a Self-Administered Questionnaire (SAQ). The online questionnaire will be electronically distributed using REDCap. All the elementary teachers at the schools within the district of Chatham County whose principals accept participation in the survey will be invited to fill out the questionnaire. The emails will be distributed by the principal of each school. We will use the Validated translated version of the Hiroshima University–Dental Behavioral Inventory (HU–DBI) questionnaire and a questionnaire that explores teachers’ knowledge and attitudes on oral health (Lopez et al, 2020). Descriptive statistics will be used to analyze data. Results: Project is in development phase and will be soon submit to IRB review.

Poster #33
Access to Dental Care of Patients with Special Needs in North Carolina
Moon S, Moss M

Patients with special needs often face unique challenges in accessing quality healthcare, including dental care. In North Carolina, there is evidence of significant regional disparities in the availability and utilization of special needs dentistry resources. This poster aims to explore these disparities and identify potential contributing factors. Examining data on the distribution of disabled populations and special needs dentistry resources across the state, we aim to explore on the current landscape of special needs dentistry in North Carolina and highlights areas in need of improvement. By addressing these issues, we hope to ensure that all individuals in North Carolina, regardless of their location or disability status, have access to the dental care they need to maintain good oral health. To promote current health care needs, East Carolina University School of Dental Medicine has established Community Service Learning Centers where dental office is scarce. Establishing Dental Care Hospital for the Special Needs seems necessary to provide advanced health care services to meet the needs of patients with special needs.

Poster #34
An Analysis of Special Needs Healthcare Coverage in Four Countries
Hartung L, Kurian T, Bui N, Moon S

Objective: The purpose of this poster is to investigate the health insurance systems of other countries in order to apply the data to a comparative analysis of the respective health insurance system in the United States. This analysis and comparison will be completed to effectively deliver dental health care services to special care patients in need. The countries being reviewed are the following: Ontario, Canada; Japan; the United Kingdom and the United States. Most of the countries studied allow dentists to visit a facility and/or the patient’s residence in the event that
the given patient may be presented with difficulty visiting a dental facility. In Japan, preventive dental care and associated behavioral management are covered by a national health insurance system. Adopting and applying effective dental care systems could help to encourage and support local dentists in treating more special needs patients in their offices. **Methods:** A search was conducted to identify different health care systems, and their inclusions, in Ontario, Canada; South Korea; Japan; the United Kingdom and Germany. Many peer-reviewed articles, and governmental websites were analyzed to collect integral information about the health care systems in place, in the above countries, that can then be used in completing statistical and observational comparative analysis. **Results:** Project is in development phase.

**Poster #35**
**Analyzing Patient Odds of Receiving Dental Care Based on Demographics**
Everingham H

**Objective:** Lack of adequate access to dental care across varying populations is evident. People with certain backgrounds face challenges when seeking out dental care that those of another background may not. Poor oral hygiene influences overall systemic health and is an issue that should be addressed with public health efforts. One of the first steps to confronting the oral health disparity is identifying the groups that are in need of heightened public health intervention. **Methods:** To determine the characteristics that correlate with lower odds of receiving dental care, dental visit data collected by the Center for Disease Control over the span of 23 years was analyzed. **Results:** It was found that one’s race/ethnic background, poverty level, and geographic region have a significant impact on the likelihood of having a dental visit each year. **Conclusions:** Results demonstrate the importance of public health work to create equitable situations for all people regarding receiving oral healthcare. People are most likely to have a dental visit yearly if they are white, well above the poverty level, and live in the Northeast. This supports the hypothesis that those who live in rural areas like the South and who are below poverty levels are not receiving as much dental care. The gap in care between different demographic or geographic groups can be narrowed with oral health education promotion and reduction of financial strain.

**Poster #36**
**Parental Perception on Continuity of Care in a Pediatric Dental Setting**
Stahley C, Ball R

**Objective:** The objective of this study is to evaluate the preferences of parents on seeing the same dental provider or different providers in a pediatric dental setting. **Introduction:** Continuity of care has been defined as “repeated contact between an individual patient and doctor.” This repeated contact provides the opportunity for better understanding of each other’s views and priorities. Handling pediatric patients adds an additional member into the treatment, creating a triangle between patients, parents, and doctors. There is a clear rationale for the use of continuity of care as doctors are able to collect accumulated knowledge of patients in order to provide improved treatment outcomes. Continuity of care is “considered one of the important attributes pf primary health care as it has been associated with improved communication, trust, empathy, and interpersonal relationships.” Establishing trust, especially for pediatric dental patients, is a key aspect to make patients and parents comfortable in a dental setting. In a large practice, pediatric dental patients may see different providers each time they go to the dentist. This could lead to confusion and uncertainty between each aspect of the treatment triangle. Hence, it is important to assess parental perception on continuity of care in pediatric dental settings. Therefore, the objective of this study was to answer the research question: Do parents of pediatric dental patients prefer continuity of care in a pediatric dental setting? **Methods:** A research survey
The survey will assess their preferences on having their child see the same dental resident throughout dental treatment. The data will be collected from RedCap, and a simple data analysis will be utilized to compare responses. There are no expected adverse events. There will be no potential benefits or harms to participants. No PHI will be collected from participants. **Results:** To be determined.

**Poster #37**

**Parental Awareness of the Importance of a Child’s First Dental Visit**

Savoy C, Ball R, Moss M, Acosta Rodriguez K

**Objective:** The purpose of this study is to evaluate the age and reason for the first dental visit and the parental awareness of the importance of the first dental visit for children of the Eastern North Carolina region. Parents of new patients in the pediatric dental clinic will be asked to fill out surveys to evaluate their awareness of a first visit in order to understand how we can better educate parents of our community. **Methods:** A cross-sectional study is planned. IRB approval will be sought. 100 surveys will be collected from the parents of new patients who visit East Carolina School of Dental Medicine for a new patient exam. Surveys will be provided to the participant via an iPad in the pediatric clinic prior to the child’s first visit. REDCap will be used to store and report the collected data from the surveys. **Results:** To be determined **Conclusions:** We expect to find that most parents are unaware of the AAPDs recommendation of the age of a first dental visit and do not understand the reason for why first visits are important.

**SCHOLARSHIP OF TEACHING AND LEARNING**

**Poster #38**

**Survey of Predoctoral Endodontic Programs’ Root Canal Sealer Use**

Schnoor Z, Lindauer P

**Objective:** 1). Determine the use of proprietary root canal sealers containing bioceramic materials in U.S. and Canadian dental schools having an undergraduate endodontic program. 2). Determine what techniques were being used to place the sealer and obturate the canal system. 3). Understand why the change was made away from traditional sealer to bioceramic sealer. **Methods:** All predoctoral endodontic program directors at U.S. and Canadian dental schools were sent an email inviting them to participate in a survey regarding the use of traditional and bioceramic containing root canal sealers in their predoctoral clinic. **Results:** 30 of 67 surveys were completed (44%). Of the respondents, 47% (n=14) used bioceramic sealer, and 53% (n=16) did not. For those using bioceramic sealers, 64% placed sealer into canals by coating files, paper points, and/or gutta-percha cones, 27% used an injection technique that followed the manufacturer’s instructions, and 9% employed a different method. The obturation technique most used with bioceramic sealer was the single cone technique (45%), followed by lateral compaction (27%) and warm vertical compaction (27%). A carrier-based technique was not used. The rationale for switching to a bioceramic sealer was based on studies showing favorable biologic and physical-chemical properties (63%), followed by outcome studies (18%) and a combination of both (18%). For those using bioceramic sealer, 72% were pleased with it thus far, and 27% were undecided. **Conclusion:** Bioceramic sealer use is increasing at U.S. and Canadian dental schools. Single cone technique was the most common obturation method used with bioceramic sealer. Use of bioceramic sealer with single cone technique may provide a simple obturation method
with equivalent outcomes to traditional sealer and other obturation techniques. Determining the incidence of use of bioceramic sealer helps the dental community better understand the current acceptance rate of these new sealers.

**Poster #39**

**Implementation and Development of Clinical Caries Risk Assessment and Management**

Kaur R, Cook J, Bauza-Davila L, Moss, M

**Abstract:** Caries risk assessment (CRA) is an evidence-based component for management of patient care known as CAMBRA (Caries Management by Risk Assessment). CRA explicitly targets dental caries which is multi-factorial and aims to reduce risk and promote oral health by utilizing individual risk assessment and risk-based treatment planning. Reevaluating caries risk is necessary over time to confirm and reevaluate patients' adherence to and responses to the suggested management plan which may include preventive and/or both restorative treatments. Standards for Pre-doctoral education programs specify that schools must train graduates to be competent in health promotion and disease prevention, including caries management (CODA Standard 2-24d). This project describes the data-driven actions taken by the ECU School of Dental Medicine to address this competency using student research, scholarship, and faculty engagement to guide improvement.

**Poster #40**

**Survey of Predoctoral Dental Students Pre and Post Pediatric Dental Rotation: Assessment of Knowledge and Comfort in Treating Pediatric Patients**

Howard E, Tucker N, Moss M, Acosta Rodriguez K

**Introduction:** Pediatric rotations as practicing student doctors are vital for the future of pediatric dentistry, but little is known about dental students' perceptions of the field before and following these rotations. By surveying dental students about their perspectives on pediatric dentistry before and after their pediatric rotation, this study seeks to understand the strengths and weaknesses of the educational experience during rotation. To be more precise, this study will compare dental student attitudes and perspectives toward pediatric dentistry before and after a pediatric rotation. The study also aims to evaluate the relationship between the dental student's level of interest in pediatric dentistry, self-assessed knowledge, and attitudes toward pediatric dentistry prior to and following the pediatric rotation. The results of this investigation will offer crucial insights to possible changes in the predoctoral pediatric dentistry education.

**Methods:** Qualtrics survey will be utilized, and IRB approval will be sought: Develop two surveys. Pre and post surveys will capture the data needed for the research study. They will include questions about the pre-rotation and the post-rotation knowledge and comfort levels of the predoctoral 3rd and 4th year dental students. Recruitment of participants. Participants who are currently enrolled in a pediatric dental rotation will be informed verbally and in writing that pre and post surveys will be a requirement for the completion of their pediatric dentistry rotation. The reasoning and goals for the study will be explained by Predoctoral Director, Dr. Nikki Tucker. The survey will be administered electronically before and after the pediatric dental rotation to capture the changes in knowledge and comfort levels. The survey responses will be analyzed for any patterns and trends in the data. The results of the research study should be written up in a report and poster format in preparation for the research presentation at the 2024 AAPD annual conference. **Results:** An improvement in knowledge and comfort in treating pediatric patients during the rotation may be one of the anticipated outcomes of completing the research survey of predoctoral dental students prior to and following their pediatric dentistry rotation. The survey results might also shed light on the many facets of pediatric dentistry that students felt more at ease with and the
ones that might require more focus. The survey may also shed light on any subject areas where students encountered difficulties. **Conclusion:** The anticipated results can be concluded to improve or supplement the predoctoral pediatric dentistry educational experience in the hopes of producing general dentists who feel equipped and confident to treat the pediatric patient when deemed necessary.

**Poster #41**  
**Improving Access to Care: The Lewis Collaborative in Pediatric Dentistry**  
Webb M, Moss M  
**Purpose:** The purpose of The Lewis Collaborative in Pediatric Dentistry is to increase access to pediatric dental care by providing training to general dentists through a hybrid learning model. In addition, the effectiveness of the participant’s learning experiences will be assessed. **Methods:** The Lewis Collaborative in Pediatric Dentistry was developed to increase the knowledge and skill level of general dentists who treat children in rural and underserved areas of North Carolina. This program covers a broad spectrum of topics in pediatric dentistry ranging from simple restorative procedures to the treatment of medically complex children. The program is divided into three modules with each module having readings and activities that are competed prior to coming to the School of Dental Medicine. While at the SoDM, the material and activities for that module will be reviewed and the participants will also engage in pediatric dental clinical experiences. In order to assess the effectiveness of this program, pre, post and follow-up surveys will be conducted. The participants will be assessed on their ability to provide pediatric dental care and the program will be assessed to determine if it has met the goal of providing greater access of dental care to children. **Results:** The expected result is that there will be an increase in the provider’s knowledge and skills related to providing dental care to children and that access to care will be improved. **Conclusions:** In addition to providing access to care and increasing provider’s ability to treat children, this program also hopes to show that the hybrid model of continuing education is effective.

**ORAL PRESENTATIONS**  
*To be offered between 9 – 10 am (repeated every 15 minutes)*

**Ross Hall 2303 (Poster #42)**  
**The Need of Virtual Reality (VR) In Dental Education**  
Elgendy H, Sensi L, Aileru A, Abdelaal M, Sheba M, Martinez Luna A  
**Objectives:** Virtual Reality (VR) is becoming an essential part of modern, contemporary education. Especially in dentistry. VR is also being utilized in various ways: improving hand-eye coordination in pre-clinical, desensitizing patients with dental anxiety, and facilitating visualization of head and neck anatomy. VR encourages active learning and leads to a more experiential learning experience (Kavanaugh et al., 2017). VR has been shown to promote deeper learning as students are able to explore and immerse themselves in the experience, with no outside distractions taking away from the object or experience occurring in the headset. This poster will demonstrate how the virtual reality being implemented in dental schools. **Materials and Methods:** Using the medical holodeck apps (https://www.medicalholodeck.com/en/), any item including teeth can be scanned and viewed, including cross-sectionally, in the VR headset. This will give the student a way to explore dental morphology in more depth, and get a realistic experience as opposed to the unrealistic representations of teeth in most dental simulations in VR that are currently available. Furthermore, new apps can be developed to use on the headsets and there is growth happening each year in health sciences application availability. The application is an immersive
3D VR anatomy surgical planning and operating guide that allows CT, MRI and DICOM scans to be imported into the app for virtual simulation, instruction, and visualization. **Conclusions:** Modern digital technologies can potentially reshape dentistry both on an educational and clinical level. Students may improve their knowledge and practical skills. Dental clinicians may use these technologies as useful aids in their practice.

**Ross Hall 2305 (Poster #43)**
**Different Candida-Host Interactions in HIV Disease**
Abuna G, Murata R

**Background:** Candidiasis is an opportunistic fungal infection, infections can be acute or recurrent, and they are common in immunocompromised patients, especially those infected with the human immunodeficiency virus. HIV is responsible for the development of AIDS. Candidiasis affects up to 50% of untreated HIV-1 subjects and 90% of AIDS patients. Interestingly, HIV-1 interacts with *Candida* spp, and this interaction overrides the production of HIV-1 by infected macrophages.

**Objective:** The aim of the study was to investigate the gene expression by which *Candida* spp interferes with HIV-1 pathogenesis. Candida spp affect HIV-1 infection involve the upregulation and downregulation of genes. **Methods:** Human monocytes (THP-1) were cultured in RPMI-1640 medium with 10% fetal bovine serum and 0.05mM of 2-mercaptoethanol at 37ºC in 5% CO2. The cells were exposed to a variety of *Candida* spp (tropicalis, glabrata, and dubliniensis) and HIV-1 BaL for a period of 3 hours. RNA was extracted and purified utilizing a QiaGen RNA extraction kit. The RNA was reverse-transcribed, and the cDNA was barcoded and pipetted into an Oxford Nanopore Mk1C device for sequencing. The data from the Mk1C was analyzed using EPI2ME software to determine modulation of genes. **Results:** There is modulation of genes associated with the toll-like receptor signaling pathway which may induce proinflammatory effects. Over 11000 genes were analyzed using EPI2ME-LABS software and genes that showed a log2 fold change above 2 and below -2 were inputted into the DAVID functional annotation bioinformatics microarray analysis to find pathways with upregulation or downregulation. **Conclusion:** There is modulation of genes in response to candida infection in the toll-like receptor pathway which primarily involve the PI3K and MAPK signaling pathways. Inflammatory cytokines are upregulated and result in proinflammatory effects.

**Ross Hall 2307 (Poster #44)**
**Correlation between Pre-Extraction Periodontal Status and Overdenture Peri-Implant Microbiome**
Cui X, Martinez Luna A, Gillone A, Abdelaal M, Sheba M

**Objectives:** The aim of this study is to investigate the correlation between pre-treatment periodontal status and the peri-implant microbiome and clinical parameters in a group of 25 completely edentulous patients treated with extractions followed by implant-retained overdentures. **Methods:** De-identified demographic data was collected from electronic health records. Pre-treatment periodontal diagnosis was obtained, peri-implant clinical parameters were recorded, peri-implant subgingival plaque were collected, and DNA extraction and next-generation sequencing were completed. Bacterial findings were compared to the Human Oral Microbiome Database. 16S rRNA Gene V1V3 Amplicon Sequencing was conducted by Zymo Research. Taxonomy bar plots, alpha diversity, beta diversity, differential abundance, Linear discriminant analysis LDA Effect Size (LEfSe), and heat map were used to analyze the differences/similarities of microbiome between groups. **Results:** Mean age of patients included was 70, median age was 69. Female to male ratio was 0.92. Four patients’ pre-treatment periodontal diagnosis was reduced periodontium, four patients had localized periodontitis, seven
patients had non-end stage/grade generalized periodontitis, and ten patients had end stage/grade generalized periodontitis. 36 implants were Zimmer TSV, 12 implants were Straumann BLT, and 2 implants were 3i NanoTite Certain Prevail. 31 implant sites were diagnosed as peri-implant health, and 19 implant sites were diagnosed as peri-implant mucositis. 17 patients had used the prosthesis for more than a year. 16S rRNA sequencing results showed certain Streptococcus spp. were more prevalent in males, while some periodontal pathogens were more prevalent in females. Significant bacterial differences were detected among different pre-extraction periodontal status groups. Actinomyces oris, Gemella sanguinis, Streptococcus intermedius, and Streptococcus oralis were more prevalent in peri-implant health sites. **Conclusions:** No peri-implantitis site was detected in this study. Different peri-implant bacteria were detected among different pre-extraction periodontal status groups. Pre-extraction periodontal condition might affect peri-implant microbiome in completely edentulous patients treated with implant-retained overdenture.

Ross Hall 2309 (Poster #45)
The Use of Artificial Intelligence in Implant Digital Workflows
Folk L, Wu Y, Gillone A, Martinez Luna A

**Objective:** Artificial intelligence (AI) has increased its presence in dentistry, including implantology. Digital workflows for implant placement and rehabilitation have gained popularity over the years due to improved accuracy, reduced surgical time, better communication, and improved prosthetic outcomes. There are multiple softwares for implant planning and static guide design, however, there are different steps that the clinician needs to complete. This case report will demonstrate how AI is incorporated in implant planning and static guide design as it mimics the intelligence of humans to complete the steps that were traditionally completed by the clinician. **Material and Methods:** A 44-year-old healthy female patient presented to the East Carolina University School of Dental Medicine clinic for implant treatment. A mandibular CBCT was exposed, and an intraoral scan was obtained with Cerec Omnicam®. Data were imported into CoDiagnostix® software for planning and guide design. Image segmentation, panoramic curve, nerve tracing, patient position and image superimposition were completed using the artificial intelligence features. The implant position was planned, and the guide was designed and printed. Implant placement was completed using a fully guided protocol. **Results:** AI tools in the implant digital workflows were successfully used to fabricate an accurate static surgical guide in less time while obtaining the planned implant position. **Conclusion:** The use of AI in the implant digital workflows allows the clinician to significantly reduce time while increasing accuracy. The described AI features allow for a precise guide design and implant placement.