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2024 Celebration of Research and Scholarship

East Carolina University School of Dental Medicine

ECU SoDM Office of Innovation and Discovery

[1]*School of Dental Medicine, East Carolina University, Greenville, USA*

CORAS February 7, 2024

The Celebration of Research and Scholarship (CORAS), hosted by the East Carolina University (ECU) School of Dental Medicine showcases student, resident, and faculty research, clinical case studies, and scholarly achievements in oral sciences.

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Poster Assigments and Abstracts

Clincial Research

1

Parental perception on continuity of care in a pediatric dental setting

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This research explores parental perceptions on continuity of care within pediatric dental settings, where the patient-provider-parent triad intertwines. Continuity of care, characterized by ongoing interactions between patients and healthcare providers, fosters trust and rapport. In the context of pediatric dentistry, this study investigates whether parents prefer their children to see the same dental provider across visits and its implications. Conducted at the East Carolina University School of Dental Medicine, the survey-based study collected data from 102 parents of pediatric dental patients. The majority (93.1%) favored continuity of care, emphasizing its role in trust-building and comfort. Parents believed their child's behavior (89.1%) and overall dental experience (93.1%) would improve with a consistent provider. Interestingly, while 67.3% were willing to wait longer for appointments to maintain continuity, 32.7% prioritized shorter waits. These findings underscore continuity of care's potential to enhance pediatric dental experiences while highlighting the intricate balance between preferences and practicalities. This study contributes insights for pediatric dental practitioners seeking to optimize patient and parent satisfaction along with emotional well-being within pediatric care.

2

Parental Awareness of the Importance of a Child's First Dental Visit in Eastern North Carolina

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The aim of this research study is to assess the age at which children in Eastern North Carolina make their first dental visit and to examine the reasons behind these visits. Additionally, we seek to gauge parental awareness regarding the significance of the first dental visit. To achieve these objectives, we collected and analyzed data from 50 surveys administered to parents of new patients visiting the East Carolina School of Dental Medicine Pediatric Clinic for a new patient examination. The median age of children being seen for new patient exams was 3 years of age. Parents also selected that they believe the age of a first dental visit should be between 3 to 5 years of age and selected the reason for not coming in earlier was due to patient compliance. However, majority of the parents surveyed selected that they were coming in to establish dental care. Parents are not aware of the importance of establishing dental care early as the American Academy of Pediatric Dentistry recommends. It is important to promote early dental visits, and one way this may be improved is by educating pediatricians on the importance of infant oral health and a dental home.

3

CBCT Analysis of Nasopalatine Anatomy Relative to Maxillary Incisors

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Implants have been widely used to restore missing teeth. The anatomic relationship between maxillary central incisor and nasal cavity/nasopalatine canal (NPC) must be considered when placing dental implants in the area. CBCT scans were screened and 145 cases (55 males, 90 females) were included. The following parameters were measured: the shortest distances from maxillary central incisors to lateral border of NPC at crestal bone, mid-root, and apical levels; the distances from apices of maxillary central incisors to the floor of the nasal fossa; mesial-lateral dimensions of NPC at middle root levels; and the angulations between the long axis of incisors relative to vertical plane. The data was analyzed using a repeated measures LMM. Intraclass correlation coefficient (ICC) was calculated for operator reliability. The averaged distances from maxillary central incisor to NPC were 1.72±0.77mm, 1.95±0.84mm and 4.26±1.55mm at crestal bone, mid-root and apical levels, respectively. The averaged distance from apices of central incisors to floor of nasal fossa was 7.24±2.76 mm and demonstrated a significant increase with age ($p<0.01$). Width of the NPC at mid-root level was 4.43±0.97mm, which showed a significant difference based on incisal position ($p=0.03$). Tooth angulation was 23.9°±8.47°, which demonstrated significant age-related decrease ($p<0.01$) and asymmetry ($p<0.01$). No significant differences in gender were found. The ICC coefficient was 0.94, indicating strong measurer reliability. The anatomical relationship between maxillary central incisors and nasal fossa/NPC demonstrates age-related and asymmetrical differences. The incisors are farther away from the nasal floor and become more vertical with age, which might affect the choice of implant size, type and angulation for immediate placement. Clinicians should be aware of possible asymmetry in this region. More study regarding the anatomy of the anterior maxilla is beneficial for maximizing success rate and avoiding damage to critical structures.

4

Reviewing the Impact of SillHa Analysis in Dentistry: Transformative Practices, Empowering Patients, and Shaping the Future of Oral Health Care

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The aim of this project was to assess the transformative impact of SillHa analysis on dental practices and patient care, with a focus on risk-oriented diagnostics and the integration of oral health into holistic well-being. Objectives: 1. Evaluate the effectiveness of SillHa technology in establishing baseline oral health parameters during new patient examinations. 2. Monitor and analyze longitudinal data from SillHa assessments during recall appointments to gauge improvements or changes in oral health over time. 3. Investigate the role of SillHa results as educational tools, assessing their efficacy in communicating specific oral health risks to patients and promoting proactive preventive measures. 4. Examine the ability of SillHa analysis to identify trends within patient datasets, aiding in the evaluation of treatment plan effectiveness and guiding necessary adjustments for optimal oral health outcomes. 5. Explore the implementation of tailored treatment and preventive measures based on individual risk factors or analyte imbalances identified through SillHa analysis. 6. Assess the contribution of dental practices utilizing SillHa in accumulating valuable data for research purposes, with a focus on refining dental protocols and advancing oral health care practices. This comprehensive review critically examines the transformative influence of SillHa analysis on contemporary dental practices and patient care. Focused on a paradigm shift towards risk-oriented diagnostics, the integration of oral health into holistic well-being, and the potential long-term implications for dentists, the review encompasses a multi-faceted assessment. Key areas of investigation include the efficacy of SillHa in establishing baseline oral health parameters, the utilization of longitudinal data for monitoring improvements over time, and its role as an educational tool to communicate specific oral health risks to patients. The review critically evaluates the technology's contribution to treatment plan effectiveness, its ability to identify trends within patient datasets, and the implementation of tailored interventions based on individual risk factors. Moreover, the accumulated data's significance for research purposes, its potential in refining dental protocols, and the impact on advancing oral health care practices are systematically explored. The SillHa oral health evaluation tool is specifically crafted to provide comprehensive insights into gum health, tooth condition, overall oral health, and hygiene. Employing oral rinse samples as the primary investigative medium, this instrument meticulously assesses various aspects crucial to oral wellness. The seven key analytes measured by SillHa include cariogenic bacteria, acidity levels, buffer capacity, blood content, leukocyte count, protein concentration, and ammonia presence. Utilizing oral rinse samples, SillHa employs a proprietary analytical process to quantify the aforementioned analytes, thereby yielding a detailed profile of the oral health status. It is imperative to highlight that SillHa does not serve a diagnostic function but rather operates as a specialized tool intended for dental health care professionals, including dentists and hygienists. The principal purpose of SillHa is to facilitate patient education regarding oral wellness, offering a nuanced understanding of individualized oral health conditions. This emphasis on education underscores its distinct role within the dental healthcare framework, reinforcing its non-diagnostic intent.

Incorporating it in Dental Practice: The integration of SillHa analysis into dental practice yields substantial benefits, both in terms of clinical assessment and patient care. SillHa analysis serves as an invaluable tool during new patient examinations, establishing a baseline for oral health parameters. Subsequent assessments during recall appointments enable a systematic evaluation of improvements or changes in oral health over time. This sequential analysis not only aids in tracking patient progress but also facilitates a comprehensive understanding of the dynamic nature of oral health. Utilizing SillHa results as educational tools, dental professionals can effectively communicate nuanced information to patients regarding their specific oral health risks. This personalized approach empowers patients with insights into their oral wellness, fostering a proactive mindset towards preventive care and maintenance. SillHa analysis contributes to trend identification within patient datasets, enabling practitioners to discern patterns or deviations in oral health metrics. This analytical capability is instrumental in evaluating the efficacy of treatment plans, guiding practitioners in making informed adjustments to optimize oral health outcomes. For individuals exhibiting specific risk factors or analyte imbalances, SillHa analysis guides the implementation of tailored treatment and preventive measures. This targeted approach addresses unique oral health needs, ensuring a customized and effective intervention strategy. Dental practices employing SillHa actively contribute to the accumulation of valuable data, creating a reservoir for research endeavors. The insights derived from this data pool have the potential to refine dental practices, enhance treatment protocols, and drive advancements in the field of oral health care. SillHa technology in saliva analysis has the potential to revolutionize dental practices, promoting a proactive approach by assessing risk factors and engaging patients in their treatment. It

serves as a diagnostic tool, guiding tailored interventions and preventive strategies, contributing to the evolution of oral health care. While its immediate impact is evident, ongoing research is crucial for long-term implications, including comparative studies to refine protocols and optimize saliva analysis in improving oral health outcomes.

5

Retrospective Analysis of Regenerative Endodontic Procedures

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The objective of this work was to determine the number of regenerative endodontic procedures completed and survival rate of such teeth in a dental school practice.

Methods: A retrospective analysis of extant data from SoDM's electronic dental record system was performed. The database was searched for charts having a D3355 (pulpal regeneration-initial visit), D3356 (pulpal regeneration-interim medication replacement), and D3357 (pulpal regeneration-completion of treatment) recorded between 2011 and June 2023. Inclusion criteria included the previous three CDT codes, a follow up exam or odontogram entry for the treated tooth, or a subsequent extraction code for the treated tooth. While 20 cases were identified, only 14 cases were completed and analyzed. There were 4 female and 10 male patients between the ages of

08 and 35 years in the study with a mean age of 13 years. All teeth were anteriors. Six teeth were not completed: one patient refused to continue, one had an MTA apexification procedure, two patients never returned and two had nonsurgical endo treatment. Two teeth were treated due to caries and 12 due to trauma. All cases used calcium hydroxide paste as the interim medicament and MTA as the final agent. All teeth that had completed treatment survived the study period. 12 of 14 patients returned for follow-up evaluation. Staining was noted in one tooth. No increased in root length was noted in any tooth, four teeth had increased root thickness, and one tooth responded to vitality tests. The average time to complete the treatment was 62 days. Within the confines of an exploratory pilot study using retrospective analysis of nonsurgical regenerative root canal procedures, we found all treated teeth survived.

6

Quality of life (Qol) in pediatric patients with oral lesions secondary to inflammatory bowel diseases (IBDs): a prospective study

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Inflammatory bowel diseases (IBDs) are a group of chronic inflammatory conditions that affect the digestive tract. The two primary types of IBD are Crohn's disease (CD) and ulcerative colitis (UC) have been reported in 1.2 million Americans. Oral manifestations of IBD are common and may cause physical and emotional discomfort in affected individuals and can significantly reduce their quality of life (QoL). To examine the QoL in pediatric patients with oral manifestation of IBD. This was a single-center, prospective cross-sectional study of pediatric patients (ages 2-18) diagnosed with IBDs and oral manifestations of IBD seen at the University of California San Francisco (UCSF). The study was conducted between September 2021 and April 2023. Eligible patients or their guardians engaged in an online survey that incorporated the modified Chronic Oral Mucosal Diseases Questionnaire-15 (COMDQ-15). This tool was designed to gauge the effects of oral diseases on their quality of life, probing into domains such as physical discomfort, medication, emotional and social repercussions, and patient support. Data were collecting using Redcap. Descriptive analyses were used to summarize the data. Responses to the COMDQ-15 were scored on a 5-point Likert scale from "not at all" (0) to "extremely" (4). Means and the standard deviations were calculated for each domain. A total of 193 pediatric patients with oral lesions secondary to IBD were identified. Of these, 30 (15.5%) completed the survey questions. The average age of participants was 15 years, with the majority (66.7%) diagnosed with Crohn's Disease. The most commonly prescribed systemic medications for IBD were infliximab (63.3%) and adalimumab (16.7%). Oral ulcers were the most prevalent oral condition (93.3%). Questionnaire results highlighted a range of experiences, from physical discomfort to emotional impact, with (46.7%) reporting no discomfort during oral hygiene activities and (46.7%) feeling not at all emotionally impacted. The COMDQ-15 score revealed that sensitivity to spicy and acidic foods had the highest mean score (1.47 SD: ± 0.97) and patients expressed the most satisfaction with family support, averaging a score of (2.93 SD: ±1.16). Pediatric patients with IBD often present with oral lesions that may significantly compromise their QoL. Timely identification and early intervention for these lesions are paramount to improve patient's overall health and QoL. Clinicians should be cognizant of the profound repercussions of these lesions on pediatric patients' well-being and should advocate for a collaborative, multidisciplinary approach with oral medicine specialists for optimal clinical outcomes.

7

Treatment Outcomes of Four-Implant Retained Maxillary Palateless Overdenture: A 5-Year Observational Study

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Palateless overdentures provide advantages of improved taste perception and retention over conventional dentures. We aimed to evaluate 5-year outcomes of four implant maxillary palateless overdentures. In this prospective observational study, edentulous participants were enrolled. A new conventional maxillary denture was prepared followed by implant placement and insertion of four implant retained maxillary palateless overdenture. Oral health quality of life was assessed using the 49-item Oral Health Impact Profile (OHIP-49) at multiple intervals over five years along with biological and mechanical outcomes. Nine patients were evaluated at year 5. The mean age was 68 years, and six of the nine patients were males. The cumulative survival rate of implants was 100% while the implant success rate was 86%. Nylon retentive replacement was the most common encountered complication noted approximately 4 times per patient over 5 years. From a mean OHIP-49 severity score of 71.2 at baseline, severity scores decreased to 23.9 (p=0). Four implant supported maxillary overdenture appears to have good patient perceived, biological and mechanical outcomes over 5 years.

8

Determine the accuracy of CBCT Reconstructed Panoramic Images in Periodontal Assessment

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Periodontal probing and intraoral radiography are conventional methods for

periodontal assessment. CBCT-reconstructed multiple planar or cross-sectional views have been utilized for periodontal assessment; however, it is complicated and time-consuming. The objective of this study is to evaluate the accuracy of CBCT-stimulated panoramic projection on periodontal assessment, to develop a simplified and efficient periodontal evaluation tool. CBCT taken at East Carolina University School of Dental Medicine from 2014-2023 were screened. The inclusion criteria were: (1) Diagnostic quality CBCT covering maxilla and/or mandible; (2) Full mouth surveys taken within 6 months of CBCT scans; (3) Clinical attachment loss (CAL) noted in perio charting. The cementoenamel junction (CEJ) to alveolar crest distance on mesial and distal surfaces of maxillary and mandibular central incisor, canine, first premolar, and first molar were measured on bitewings/periapical radiographs (BW/PA) and CBCT-simulated panoramic imaging. CALs were extracted from perio-chartings. Normal distribution of the data was assessed by Kolmogorov-Smirnov analysis. One-way ANOVA followed by Tukey's HSD post hoc test and Pearson correlation were run to analyze the data. Intraclass correlation coefficient (ICC) was calculated to determine the consistency of operators' measurements. All tests were performed with SAS program. Statistical significance was set at $p < 0.05$. CBCT, BW/PA, and CAL demonstrated comparable results and strong correlations among each other for periodontal assessments for majority of the sites, except at mandibular central incisor and canine region, where CBCT and PA showed significantly more bone loss relative to CAL, and at mandibular molar region, CBCT revealed significantly more bone loss compared to BW. An ICC value of 0.86 confirmed the consistency of operators' performance. CBCT-reconstructed panoramic imaging is reliable in periodontal assessment. Some discrepancies exist among the three evaluation methods, probably due to tooth-specific periodontal configuration and projection geometry of intraoral radiographs.

9

Fluoride Varnishes Impact on Oral Biofilm Microbiome in High-Caries-Risk Population

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The formation of white spot lesion (WSL) around orthodontic accessories is considered a reversible iatrogenesis, with a high frequency of occurrence. We aimed to address the gap in literature regarding the impact of high fluoride concentrations on cariogenic biofilm in vivo. Conducted on high-caries-risk patients, the present research employed a clinical experimental model to investigate the oral biofilm microbiome differences after sodium fluoride (NaF) or titanium tetrafluoride (TiF4) varnishes treatments. The study aimed to enhance knowledge by performing a comprehensive 16S rDNA profiling of the biofilm microbiome, shedding light on microbial dynamics in dental caries prevention. A double-blind randomized crossover study was carried out with 13 adolescents after approval by the ethics committee in research with human beings of Bauru School of Dentistry, University of São Paulo. Inclusion criteria: 12-18 years old, presence of fixed orthodontic appliance, and at least one active WSL. Exclusion criteria: presence of periodontal disease, calculus and/or gingival blooding, and presence of cavitated caries. Groups G1: non-treatment (before professional prophylaxis), G2: professional prophylaxis, G3: professional prophylaxis + 5.42% NaF varnish; G4: professional prophylaxis + 4% TiF4 varnish. Supragingival biofilm samples were collected. Bacterial DNA libraries were loaded onto MiniSeq reagent cartridge and the MiniSeq instrument (Illumina Inc, San Diego, CA, USA). Bacterial genera identification was carried out using QIIME2 package analyses tool. ANOVA/Tukey's or Kruskal-Wallis/Dunn's tests were performed ($p < 0.05$).

The six most prevalent genera were: Veillonella (G1: 7.6%, G2: 10.6%, G3: 9.4% and G4: 5.7%), Corynebacterium (G1: 8.2%, G2: 7.3%, G3: 6.8% and G4: 10.4%), Neisseria (G1: 4.0%, G2: 9.2%, G3: 9.6% and G4: 9.6%), Streptococcus (G1: 5.2%, G2: 8.0%, G3: 7.4% and G4: 10.1%), Prevotella (G1: 10.7%, G2: 7.6%, G3: 5.4% and G4: 4.2%) and Haemophilus (G1: 3.2%, G2: 6.6%, G3: 11.1% and G4: 6.3%). The Shannon Diversity values, presented as median, 25%-75%, minimum and maximum, per group were: G1 (6.25, 6.21-6.27, 5.99, 6.29), G2 (5.81, 5.77-5.83, 5.57, 5.85), G3 (5.63, 5.64-5.71, 5.49, 5.73) and G4 (5.76, 5.72-5.78, 5.54, 5.80). G2, G3, and G4 showed a statistically significant difference from G1, with no difference found among G2, G3, and G4 ($p < 0.05$). The NaF and TiF4 varnishes demonstrated effectiveness in substantially modifying the biofilm microbiome among high-caries-risk patients, with no discernible difference between the two fluoride treatments.

10

Preferences and attitudes of parents/guardians regarding their presence/absence in the dental operatory.

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According to the American Academy of Pediatric Dentistry, the objective of behavior guidance is to facilitate effective communication between the child, parent, and dental practitioner, fostering a positive attitude and promoting good oral health. Evolving societal views have significantly shaped the acceptance of both pharmacological and non-pharmacological methods for managing behavior. A non-pharmacological approach, namely the presence of parents in the operating room, has gained widespread approval among clinicians. Numerous studies indicate that parental anxiety can negatively impact a child's cooperation and increase anxiety. Consequently, some practitioners prefer excluding parents from the room or having them act as silent observers during appointments. While many clinicians opt to establish a stronger connection with the child and focus on behavior guidance by not having parents in the room, societal influences often lead dentists to accommodate parental preferences for presence or absence during treatment. This study aims to assess current parental preferences regarding their presence or absence during dental procedures, offering insights into parental perspectives. The findings will aid dental practitioners in developing guidelines or protocols to address parents' involvement in the operatory during dental treatments. Parents of pediatric dental patient will be surveyed. We will aim to survey ~100 participants of parents/guardians of children that are patients at the ECU School of Dental Medicine.

Surveys will be provided via an iPad during their child's dental visit. REDCap will be used to generate tables for analyses. Summary statistics will include proportions for parent preferences. Chi-square tests will compare parent preferences with parents' own past dental trauma. We anticipate that most parents, based on previous studies, would prefer to be present in the room during their child's dental procedure. This study aims to delve into the reasons behind parents' choices, whether to stay or opt out.

We hypothesize that parents who choose not to be present likely do so due to their own past dental trauma. Parents opting to stay probably believe their child will cope better with their presence. Conclusion to be determined based on data that will be collected.

11

Microbial Dynamics in Orthodontic Treatment: A Comparative Study of Fixed Brackets and Clear Aligners

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Fixed bracket (FB) and clear aligner (CA) orthodontic therapies have been individually demonstrated to alter the oral microbiomes of individuals undergoing orthodontic treatment. Microbial shifts towards dysbiosis, a state of community imbalance with a population comprised of a higher proportion of pathogenic microorganisms, can increase the patient's risk of developing periodontal disease or dental caries. Recently, the understanding of the presence of different bacteria and their degrees of pathogenicity in dysbiotic biofilm related to periodontal disease and dental caries has emerged. The objective of this work was to determine the differences in oral microbiome shifts between FB and CA orthodontic therapies. Biofilm samples were collected from three groups: 10 control patients with no orthodontic appliance (NT), 3 patients undergoing fixed bracket (FB), and 4 patients undergoing clear aligner (CA) orthodontic treatments. The bacterial DNA was extracted then amplified using a 2x KAPA HiFi HotStart ReadyMix (KAPA Biosystems, Wilmington, MA). DNA libraries were loaded onto MiniSeq reagent cartridge (Illumina Inc, San Diego, CA, USA) and the MiniSeq instrument. Bacterial genera identification was assessed by the Illumina 16S Metagenomics labs and Dragen Metagenomics Pipeline tools. In the NT group, the five most prevalent genera were Haemophilus (23.9%), Streptococcus (16.6%), Veillonella (9.2%), Actinomyces (8.2%), and Mannheimia (4.6%). For the FB group, the dominant genera were Haemophilus (15.8%), Streptococcus (13.5%), Neisseria (10.3%), Capnocytophaga (6.2%), and Porphyromonas (6.0%). In the CA group, the leading genera included Streptococcus (24.6%), Haemophilus (20.1%), Actinomyces (8.0%), Veillonella (6.8%), and Rothia (4.7%). The Shannon Diversity values, presented as median, 25%-75%, minimum, and maximum, for each group were: NT (3.04, 2.66-3.17, 1.33, 3.37), FB (3.37, 3.22-3.50, 2.97, 3.63), and CA (2.84, 2.74-3.14, 2.58, 3.53). This study revealed different alterations in the oral microbiome associated with fixed bracket (FB) and clear aligner (CA) orthodontic therapies. Our research demonstrated that the treatments assessed impact the prevalence of specific bacterial genera, highlighting differences among patients with no orthodontic appliance (NT), those undergoing FB treatment, and those undergoing CA orthodontic treatments.

12

Oral Pathology Risk Factors & Diagnosis in North Carolina

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Ninety percent of oral cancers are oral squamous cell carcinoma (OSCC), the 6th most common malignancy worldwide. 52% of patients die with oral cancer within 5 years. However, individuals with early diagnosis (Stage 1) have significantly higher 5-year survival rates, highlighting the importance of early detection of oral cancer and, ideally, its precursor lesions. The study assesses the incidence and prevalence of oral potentially premalignant disorders in rural and urban areas of NC by examining biopsy service results, risk modifiers, and clinical diagnosis sensitivity. Biostatistical analysis on each is computed in order to determine statistical significance and correlation. The surveillance of oral precursor lesions is an ongoing challenge in many healthcare systems. If lesions at risk could be reliably identified at the premalignant stage, treatment and management approaches can be implemented early, improving patient outcomes and quality of life and aiding in the efficient use of health services and resources. We aim to better understand diagnostic motifs, risk factors, and clinical presentations in the lives of North Carolinians to decrease mortality rates and increase diagnosis accuracy. Diagnostic methodologies must be advanced to achieve higher success clinically and in the laboratory.

Community/Epidemiology Research

13

Use of Teledentistry to Improve Efficiency and Sustainability of School-Based Oral Health Programs

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To improve the efficiency and sustainability of rural school-based oral health prevention programs through asynchronous teledentistry. Asynchronous teledentistry procedures were incorporated into two school-based oral health prevention programs. Hygienists perform preventive services without a dentist on-site and prior to the dentist's examination of patients. Intraoral photos and radiographs are taken and stored by hygienists at remote sites, then forwarded to dentists for review, diagnosis, and treatment recommendations. Upon chart review, patients are referred for operative treatment, placed on a recall schedule, and triaged for in-person examination. Using asynchronous teledentistry procedures allows for greater efficiency of school-based programs, especially in rural locations. These procedures allow hygienists to maximize their full scope of practice, while minimizing the time requirements and costs of an on-site dentist. Teledentistry procedures can be an effective method to mitigate oral health disparities in health professional shortage areas by improving efficiency and maximizing the scope of practice of hygienists. These methods can also decrease the time commitment required of dentists, thereby reducing program operating costs. Additionally, continuous filing of teledentistry procedures to insurance companies increases the likelihood of future reimbursement, which would significantly improve the financial sustainability of these and other similar programs.

14

Racial Disparity Among Adults with Oral Cancer Persists in the U.S. from 2000 to 2017

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We investigated trends in incidence rates, stage at diagnosis and relative survival rates among adults with oral cancer in relation to race in the context of previously uncovered cancer-specific health disparities. We analyzed 2000--2017 SEER data among adults with oral cancer from 18 registries. We used SEER*Stat to compute proportions for each oral cancer site by stage at diagnosis and race and five-year relative survival rates by sex, cancer site, stage at diagnosis, age and race and explored trends over time. Among 95,040 oral cancer cases reported to SEER, the most prevalent site was the tongue. While the rate among Black men decreased from 12.9 to 8/100,000, Blacks had significantly higher proportions of oral cancer that had spread at diagnosis than Whites. Survival rates were substantially lower among Blacks than Whites. The steep decline in oral cancer incidence rates in Black men is encouraging, although the persistent racial disparity with respect to late diagnosis and

poor survival is alarming, requiring targeted interventions.

15

Characterizing Modifiable Lifestyle Risk Factors in Complete Vascular Desert Counties in North Carolina

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Peripheral limb disease (PAD) and chronic limb-threatening ischemia (CTLI) impact over 2 million people annually. Patients often present with modifiable factors like smoking and obesity, contributing to poor CTLI outcomes with a 20% amputation rate and up to 40% long-term mortality. To date, there has been no research defining vascular deserts in North Carolina. The current study will define vascular desert counties and their characteristics. Board-certified vascular surgeons in North Carolina were characterized and addresses were geocoded utilizing ArcGIS. Counties with absolutely no vascular care centers were identified. Modifiable lifestyle factors such as smoking, obesity, and physical inactivity rate were overlaid with the vascular desert counties identified. Local community health needs assessments (CHNAs) were utilized to compare vascular desert counties with the North Carolina average. Only two of the 13 assessed counties indicated every margin of lifestyle modifiable factors below the state average. The remaining 84% of counties exhibited at least one factor above the NC average. Jones and Swain counties have significantly higher smoking rates (23% and 25%. NC Average: 17%), obesity rates (41% and 36%. NC Average: 34%), and physical inactivity rates (25% and 28%. NC Average: 22%) than the NC averages. Over half (53%) of the indicated vascular desert counties exhibit premature death rates above the NC Average. Overall, counties with no vascular care have higher rates of modifiable lifestyle risk factors than the NC Average. Furthermore, over half of the counties indicated premature death rates above the NC average. This indicates both an increased need for vascular care, and a need for lifestyle modification education in these areas in order to mitigate future vascular disease.

16

Child Caries Risk Assessment - A Pilot Study

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The aim of this study was to investigate a pediatric fluoride varnish program within primary care settings, seeking ways to enhance dental caries prevention and management by capitalizing on existing surveillance mechanisms utilizing advanced salivary testing modalities for childhood caries experience such as Sill-Ha and CariFree. The project envisions the creation of a dynamic research platform, fostering translational research endeavors aimed at identifying innovative solutions for the effective management and control of dental caries within high-risk populations. Inclusion Criteria: Children aged 6-8 years. The study is a retrospective cohort study. Using the electronic health records at ECU Pediatrics, records were examined to identify the number of fluoride varnish visits that the child received between age 12 months and 42 months. Eligible children/families were contacted by telephone and invited to participate in the oral exam and sample collection appointment at the ECU School of Dental Medicine Clinical Research Center in Greenville. A $20 gift card was offered as an incentive for study participants.

Method:

-Cheek Swab – buccal mucosa scraping with a brush designed to capture superficial epithelial cells.

-Saliva sample — a timed collection of 2 ml of unstimulated pooled whole saliva from the floor of the mouth next to the tongue will be collected using the Super-Sal collection system

-Sill-Ha Sample Collection.

-CariScreen plaque sample – plaque from lingual aspect of lower anteriors will be collected.

-Sterile toothpick Plaque samples from 6 buccal/facial sites – upper molars (2 sites) – right side and left side; lower molars (2 sites) - right side and left side; upper anteriors; and lower anteriors.

-Exfoliated primary teeth (I.e., baby teeth), if available. Parents/guardians will be asked to collect exfoliated teeth and provide these for future analysis. These will be collected at the ECU School of Dental Medicine Clinical Research as they become available. A sterilization pouch will hold the teeth and they will be marked with Subject ID, Date of Collection and Initials of Collector.

This study was for children aged six to eight years. We had 24 participants in this study, making it hard to get a good scope of results. We had 15 females and 9 males. 50% of them reported to have tooth decay and almost 13% of them had been hospitalized for dental care. It was also reported that each kid brushes their teeth at least once a day, but 67% of these children did not receive help when brushing. Most children in this study received their fluoride from toothpaste daily, but 62.5% reported to have received fluoride varnish from a doctor's office. Salivary flow time for the children in this study ranged from two minutes to over five minutes, making it hard to get a good representation from this specific data. CariFree range was high in 81% of children and low in 18% of children, high score indicating an increased risk for tooth decay. The Sill-Ha test results, as seen in the results section, gives an overall picture of oral wellness among our participants. This research represents the inaugural examination of Sill-Ha within the 6-8 age demographic. A noteworthy revelation emerged as the participants demonstrated an unexpected proficiency in executing the required Sill-Ha distilled water swishing during the evaluation. The recruitment process posed substantial challenges, with factors such as the prevailing COVID-19 conditions, enumeration issues, conflicting schedules, and varied priorities contributing to the difficulty in securing parental attendance for the scheduled appointments. The outcomes of this study suggest that Sill-Ha procedures are applicable and feasible for implementation in children, presenting a promising avenue for effectively involving parents in the proactive management of their children's caries risk.

17

Improving Infant and Child Outcomes in Eastern NC with Free Community CPR and Choking Classes

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Brody School of Medicine, East Carolina University

Free infant/child CPR and choking rescue classes to prevent infant mortality. High-quality mannequins, instructional handouts, and CPR masks are used to demonstrate effective CPR and choking prevention techniques. Classes are offered bi-weekly at the Brody School of Medicine. Infant choking/suffocation is the fourth leading cause of infant mortality nationwide. Offering free classes to parents and grandparents helps reduce these deaths in our community. In rural towns, first responders have increased response times, and it is important for all families to be prepared in the case of emergencies. The program will continue expanding by incorporating basic AED use for infants, advertising to reach a wider

population of Greenville, and partnering with local CPR programs to expand our initiative.

18

An Evaluation of Bertie County Schools' Oral Health Program

Penister C, McCarlie Jr. VW, Wright W, Moss ME, Yockey A.

School of Dental Medicine, East Carolina University

Vulnerable populations are common in the state of NC and limit to access of healthcare is a crisis itself. People have limited access to care for a variety of reasons including lack of transportation, finances, medical status, education, and society/cultural interferences. This vulnerability creates spaces for professional growth especially dentistry to serve the children who may likely be at a higher impact for less oral health education, dental caries, and undiagnosed conditions/diseases. Improvement can be made locally, North Carolina, by evaluating similar counties that envelop similar demographics to mediate the health need with substantial research findings and support on a local and state level. The convenience form of sampling the population will be used to conduct the retrospective and prospective chart review. Convenience form allows a safe and suitable way for collecting data quickly with a readily available sample with an inexpensive methodology. The retrospective and prospective chart review study will be data from pediatric dental patients referred from January 2019 – August 2024. The anticipated results from this study will confirm the higher prevalence of caries from the age group, 6-8, within this population. The learning need is significant to understand the impact of the referral system in this demographic and exposing any need for improvement. This will be essentially critical data to use for decreasing disparities in counties with similar demographics.

19

Oral health literacy of pregnant women in a rural area in Eastern North Carolina

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School of Dental Medicine, East Carolina University

Oral health literacy (OHL) refers to an individual's capacity to understand and act upon oral health information effectively. OHL is vital for expectant mothers and their children's well-beings. Maternal OHL directly influences the oral health behaviors and dental care decisions. This research aims to explore the varying levels of maternal OHL and its impact on oral health behaviors, understanding these factors is vital in optimizing oral health outcomes for both mothers and children. Goal of the study: 1. Evaluate knowledge and beliefs regarding oral health of pregnant women 2. Evaluate oral health literacy of pregnant women One-on-one interview among low-risk pregnant individuals (still ongoing). Questions included demographics, dental healthcare, maternal oral health knowledge and beliefs, dental insurance, perceived oral health, previous dental visits, and their interactions with past healthcare providers. Health Literacy in Dentistry (HeLD) is questionnaire composed of questions surrounding oral health literacy based off the participants abilities or challenges. Responses were recorded on a Likert-scale from 'Without any difficulty' = (5) to 'Unable to do'= (0), 65 is the highest attainable score. Study location: East Carolina University's Women's Physician Clinic and ECU Health Brody outpatient center. All participants were given an oral health hygiene kit for the completion of the survey. Regarding communication from OB/GYN providers, 11 participants (48%) reported not receiving any information about oral health care checkups, while the remaining participants did. When asked about cavity filling for babies, 13 participants (57%) were aware that it should be done even if it doesn't cause pain, whereas 10 (43%) did not know this information. Out of the 23 participants, 5 (21%) people have heard of the Head Start program, and 3 of them have had a child be a part of it (Head start is a United States Department of Health and Human Services program that provides childhood education and supports growth for low-income families). The study's results show a promising level of oral health literacy and strong inclination toward good oral health behaviors for their children. A substantial proportion of the participants demonstrated a good understanding of oral health and were proactive about their child's oral health care. Frequent dental visits emerged as a critical factor influencing oral health knowledge and behaviors. Participants without recent dental visits were more likely to have misconceptions and poorer oral health, highlighting the role of regular dental check-ups in reinforcing correct information and practices. Implications and future studies: Addressing knowledge gaps and access to barriers can empower expectant mothers to make informed decisions for better oral health outcomes. These findings can inform targeted interventions to improve maternal and child oral health care and reduce oral health disparities.

20

Disability Status and Oral Health in the United States

Moss ME, Luo H, Grant F, Webb M, Moon S.

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The purpose of this study is to identify factors that influence utilization of dental services among people with disabilities. Data were from the 2015-2016 and 2017-2018 National Health and Nutrition Survey (NHANES). The primary outcome variable was untreated dental caries assessed by oral examinations; it was included as both a binary outcome (yes/no) and a continuous outcome in this analysis. The exposure variable was self-reported disability (yes/no)—whether the individual has serious difficulty in conducting any of the following six activities: hearing, seeing, walking, dressing/bathing, concentrating, or running errands. The analytical sample included 11,031 adults (aged ≥20). A generalized linear model (GLM) (for the binary outcome) and a negative binomial regression model (for the continuous outcome) were run to assess the association between disability and untreated dental caries, controlling for socio-demographic and health behavior variables. All analyses were conducted in Stata 17 and accounted for the survey design of NHANES. The prevalence of untreated dental caries was higher in individuals with disability than in those without (27.2% vs. 21.0%, p=0). The study found that the prevalence of untreated dental caries was higher in persons with disabilities than in those without.

21

The Hyde County Project: Collaboration for Education, Outreach, and Service

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Honors College and School of Dental Medicine, East Carolina University

ECU School of Dental Medicine's Hyde County Project aims to bring oral healthcare to residents of Hyde County, one of North Carolina's three counties (alongside Tyrrell and Camden) without a practicing dentist within county limits. The goal of the clinic is to further sustain dental health in Eastern North Carolina through humanitarian efforts to alleviate suffering and establish a long term dental presence, prepare a pool of eligible dental candidates, and encourage service in underserved areas. For dental care, a Health Professional Shortage Area (HPSA) is classified as a population with a provider

ratio below 4,000:1 in an area with unusually high needs. Hyde County has a population of 4,576 with zero dental providers and is therefore classified as an HPSA. The advisory council, which included Hyde County residents, local government officials, and an ECU SoDM team, was formed at the beginning of the project to collaborate in order to best meet the needs of Hyde County. The ECU SoDM handled the necessities for opening and operating a dental clinic: state policies and regulations, chairs, instruments, supplies, emergency kit, administrative capabilities, and the dental students and faculty to operate the clinic. The Anonymous Trust and Hearst Foundations donated funds to handle the costs of starting the clinic. In collaboration with the Hyde County Health Department, Anonymous Trust, Hearst Foundation, and other Hyde County community members, the ECU School of Dental Medicine established the Hyde County Outreach Clinic located in Swan Quarter. The clinic operates monthly, taking 4 dental students, 2 AEGD residents, 2 faculty members, and a clinic coordinator) to Hyde County. The clinic is equipped with portable dental equipment and capable of providing examinations, x-rays, fillings, extractions, and cleanings. Advanced care and providers are made easily accessible through the ECU SoDM clinics and faculty, utilizing teledentistry and referrals. The Hyde County Health Department partners to promote accessibility through affordable transportation services. The first clinic day was April 8th, 2022. An average of 13 patients are seen each month and an average of $2,260 in treatment is provided. To date, we have conducted 24 clinic days, totaling out to over 300 patient visits and over $52,000 worth of care provided. Additionally, since the beginning of the Hyde County Outreach Clinic multiple patients have completed their treatment plans and return for routine preventative treatment. The Hyde County Outreach Clinic is an official rotation for fourth year dental students starting with the class of 2024. The Hyde County Project gives ECU SoDM faculty, staff, residents, and students opportunities to learn and grow as agents of more equitable healthcare through the Hyde County Outreach Clinic. The student participation has grown into a formal student rotation in which all D4 students participate with AEGD residents serving as clinical mentors supported by ECU Faculty. ECU Honors College students who participate gain significant exposure to oral healthcare settings in underserved populations, allowing to them to gain valuable experience in leadership roles and public health dental concepts. In Hyde County project exceeded all objective by creating access to affordable quality oral healthcare and decreasing transportation time and providing an affordable option that accepts many forms of insurance. It has also integrated oral healthcare into local primary care system for health.

22

An Analysis of Dental Medicaid Benefits for Patients with Special Health Care Needs for 7 US States

Kurian T, Bui N.

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The purpose of this poster is to investigate the Medicaid reimbursement rates in other states and perform a comparative analysis of the rates in states with varied Medicaid coverage for oral health. This analysis and comparison were completed to understand the access to care and how to effectively deliver dental health care services to special care patients in need. The states being reviewed are the following: North Carolina, South Dakota, DC, California, New York, Alabama, and Texas. Adopting and applying effective dental care systems could help to encourage and support dentists in treating more patients with special health care needs in their offices. A search was conducted through the web to identify fee schedules in North Carolina, South Dakota, DC, California, New York, Alabama, and Texas. Many peer-reviewed articles and governmental websites were analyzed and utilized in an observational comparative analysis. Each state was chosen to represent either extensive, limited, or no coverage Medicaid benefits. There were differences between reimbursement rates among the coverages with each state. Furthermore, we found varying reimbursement rates and participation for behavior management for special care recipients. Analyzing the costs and benefits for different coverage encourages the advocacy for increasing the access to care and prioritizing the oral health for those with special needs. This work is in progress.

23

Effects of dental general anesthesia treatment on early childhood caries: A restrospective cohort study at East Carolina University School of Dental Medicine

Roberts AD, Tucker N, Moss ME.

School of Dental Medicine, East Carolina University

According to the Centers for Disease Control and Prevention (CDC), tooth decay remains the most prevalent and chronic disease of childhood in the United States. The growing demand of pediatric dental services amongst children suffering from Early Childhood Caries (ECC), especially those in eastern North Carolina, challenges the dental community to create opportunities for access to care. Many children require extensive dental care or have special health care needs that indicate dental rehabilitation using General Anesthesia (GA). This study will aim to uncover the effectiveness of the access to care for pediatric dental patient's requiring treatment under GA at ECU SoDM, and the role of a dental home in promoting protective factors to decrease the rate of recurrent decay and secondary treatment using GA. Patients previously treated under GA within the last 5 years will be evaluated and assessed via a widespread Axium chart review for post-operative visit, recall and dental treatment history. This sample will include all patients treated at Surgi-Centers and ECU/Vidant Health Hospital.

- Measure the effectiveness of ECU SoDM's in the treatment of patients within ECU Health System's Surgi-Centers and the Main OR;

- Determine the ratio of patient's referred to our clinic vs those who are patients of record;

- Evaluate demographics such as: median age, race, gender, and county of origin to determine trends and correlations amongst communities treated. Pre and post-COVID-19 Pandemic trends will be considered.

- Appraise ECU SoDMs retention rate of referred/new patients following GA treatment

- Discover interventions that could improve the establishment of care for patients who do not commit to ECU SoDM as a dental home.

24

Pediatric Oral Health Status and Caregiver Oral Health Literacy

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The objective of this planned study is to evaluate whether there is an association between parental (or caregiver) oral health literacy (OHL) and the oral health status (OHS) of their children. Findings from this study are expected to provide important information that would aid community pediatric public health initiatives. This cross-sectional study's inclusion criteria will include caregivers seeking treatment for their children (≤8 years old) at a community dental office. They must not have a cognitive, visual, or hearing impairment. Eligible individuals

must have a limited understanding of English and be able to verbally communicate. Those excluded will be children and any adult with a self-reported cognitive, visual, or hearing impairment, or who have no understanding of English. A convenience sample of 300 caregiver-child dyads presenting at the office will be recruited and provide written consent plus a Health Insurance Portability and Accountability Act waiver to participate. We will utilize the Research Electronic Data Capture (REDCap) application for OHL instrument data collection and the patient's electronic health record (EHR) for OHS. Correlation coefficients will be calculated between each pair of continuous variables, such as decayed teeth, missing teeth due to caries, and filled tooth surfaces (dmfs) and the Rapid Estimate of Adult Literacy in Medicine and Dentistry (REALMD-20) score.

Based on our hypothesis we expect our results to show that caregivers with lower OHL in Eastern North Carolina will have children whose level of dental disease is higher compared to children of caregivers with higher OHL. If our anticipated result is confirmed, that caregiver OHL in this sample is associated with OHS in children, it will provide greater understanding in framing parental education and formulating interventions to improve pediatric OHS.

25

Characteristics of the populations served by ECU SoDM

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Characterize the counties where ECU SoDM serves. Material and Methods: The data was collected from counties in North Carolina where ECU SoDM has their Community Service-Learning Centers: Brunswick, Davidson, Harnett, Hertford, Jackson, Mitchell, Pasquotank, Pitt, and Robeson County. Data were collected from County Health Rankings & Roadmaps (CHR&R) and Centers for Disease Control and Prevention (CDC). Data on life expectancy, diabetes prevalence, adult smoking/obesity, child mortality, food insecurity, teen births, uninsured adults/children, reading scores, median household income, Medicaid Children Beneficiaries Utilization of Oral Health or Dental Services, Pregnant Medicaid Beneficiaries Utilization of One or More Dental Service, dentist-to-patient ratio, etc. were tabulated. The dentist-to-patient ratio ranged from 950:1 to 4,380:1 for those 9 counties. For water fluoridation, only two counties had no water systems fluoridated. For the counties, the lowest percentage of Medicaid Children Beneficiaries Utilization of Oral Health or Dental Services is 51.3% in Jackson County, while the highest was 62.3% in Harnett County. The average reading score of the counties is at a level of 3.0. The average median household income of the counties served by the SoDM is about $51,211. The lowest percentage of limited access to healthy foods was 2% in Jackson County, and the highest was 11% in Hertford County. Collectively, these data shed light on the social determinants of health within the population served by ECU SoDM.

Case Reports

26

Use of Strip Gingival Grafts with Xenogenic Collagen Membranes to Correct Mucogingival Alterations Following Bone Augmentation Procedures: Case Series

Martinez Luna AA, Blackstock M, Gillone A, Williamson MA, Paquette DW.

School of Dental Medicine, East Carolina University

This case series describes a surgical technique aimed to increase the amount of keratinized mucosa while deepening the vestibule around dental implants after bone augmentation procedures that resulted in mucogingival junction displacement and lack of keratinized mucosa. We present a case series where a combination of a free gingival graft and a xenogenic collagen membrane were utilized after altering the mucogingival junction and the vestibular depth following lateral window sinus augmentation and guided bone regeneration procedures. Subsequently, implants were placed and restored with fixed implant-supported restorations. Initially deficient ridges were successfully augmented following guided bone regeneration and sinus augmentation procedures; however, the mucogingival junction was displaced resulting in a shallow vestibule with lack of keratinized mucosa to obtain primary closure and adequate healing. To improve the tissue phenotype around the future implant sites while increasing the amount of keratizined mucosa, the areas were grafted with an apical strip gingival graft in combination with a xenogenic collagen matrix. Consistently within the confines of this case series, the soft tissue healed well, and this technique resulted in a significant increase of keratinized tissue on the edentulous ridges while relocating the vestibule apically. Implants were placed and successfully restored with fixed implant supported restorations. Patients were satisfied with function, esthetics, and the ability to clean. This technique showed to be successful at increasing the amount of keratinized mucosa around dental implants while deepening the vestibule. This procedure could be utilized to improve tissue stability and patient's ability to clean. Another benefit of this technique is that the amount of autogenous graft harvested from the palate is minimal thus decreasing patient morbidity. In addition, this technique could be used when there is insufficient autogenous tissue to successfully graft an extensive area.

27

Use of Guided Surgery for Implant Placement in a Patient with Two Right Accessory Mental Foramina and Anterior Loop: A Case Report

Gillone A, Martinez L AA, Williamson MA, Paquette DW, Sheba M, Conner C, Abdelaal M.

School of Dental Medicine, East Carolina University

The mental foramen is an important landmark when performing oral surgical procedures and dental implant placement. Anatomical variations in the mental foramen have been described throughout the literature with different reported prevalence rates and demographic characteristics. We present the case of a 66-year-old African American male patient in which static guided surgery was used for the placement of two implants adjacent to two accessory mental foramina and an anterior loop of the right mandible. Initially, the patient was referred for extraction of fractured tooth #29, and placement of implants #29 and #30. A triple foramen and a double mental foramen on the right and left sides of the mandible respectively, were identified on a cone beam computed tomography (CBCT) imaging. The case was planned with an implant software, and a 3D printed surgical guide was fabricated. Implants were placed without surgical complications. This case demonstrates that CBCT and guided implant surgery are of paramount importance for accurate implant placement in anatomically challenging cases, and to avoid neurosensory disturbances, or other undesired complications.

28

Oral Rehabilitation under General Anesthesia in a Patient with Severe Disability

Moon S.

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Providing dental care for patients with special health care needs demands professional expertise and judgement. Desirable outcomes may be achieved. A male patient with intellectual disability and autism visited Special Care Clinic in East Carolina University School of Dental Medicine. Patient had no known drug allergy on any medication. The patient had difficulty in cooperation in outpatient dental clinic for required amount and quality of treatment. The patient was uncooperative and did not respond to verbal commands. The patient was being cared by his parents and lives with family. After extensive treatment in the Operating Room under general anesthesia, patient would be seen regularly in Special Care Clinic for recall exams, prophylaxis, and preventive care. The preoperative screening tests included a thorough clinical exam and blood analysis. In the operating room, general anesthesia was induced via inhalation of sevoflurane. Nasotracheal intubation was performed, and an anesthetic status was maintained with sevoflurane, nitrous oxide, and oxygen. After Time Out, Intra oral exam performed, and full mouth series of radiographs were taken. After placing throat pack as a barrier, thorough prophylaxis performed. Soft tissue of the patient's lips, cheeks, tongue, oral mucosa, and pharyngeal tissue were all found to be within normal limits. The gingiva was erythematous and swollen due to generalized inflammation, and multiple teeth were found to be severely damaged due to fracture and caries. The occlusal anatomy of the maxillary and mandibular premolars and molars was relatively well preserved, and vertical dimension of occlusion was not noticeably decreased. The patient's occlusion displayed Class I molar and canine relationship on both sides. Treatment plan was made based on clinical and radiographic exam. The treatment plan was presented to patient's mother. Treatment plan was modified based on patient's circumstances including patient's physical condition, insurance coverage, and acceptable number of visits to OR. The detailed treatment plan included four phases: initial care, disease control, restoration, and maintenance. All dental procedures were performed by a single dental practitioner, with cooperation from the special care dentistry staff, including medical anesthesiologist, two medical nurses, one dental assistant. After the oral rehabilitation under general anesthesia, the patient recovered well from general anesthesia and discharged on the same day after the procedure. Dental treatment for patients with special health care needs can be provided based on patient's treatment needs, ability to cooperate and financial circumstances. Based on resources, traditional treatment can be modified. In the comprehensive treatment of multiple bonded anterior restorations of anterior tooth, 1-visit root canal therapy with stainless steel restoration procedures seem to be advantageous and enhance longevity of tooth.

29

Esthetic Enhancement of Peg Lateral Incisors: A Conservative Approach Using Composite Restorations - Case Report

Hussein A, Elgendy H

School of Dental Medicine, East Carolina University

Microdontia, a condition characterized by abnormally small teeth, can significantly impact an individual's smile esthetics and overall confidence. This case report focuses on the restorative treatment of patient with peg lateral incisors. The main objective of this case study was to provide an effective yet conservative solution to restore both the esthetic appearance and functional aspects of peg laterals using direct composite resins veneers. A 19-year-old female patient with peg lateral incisors was selected for this case. The treatment plan focused on conservative restoration using composite materials. A comprehensive clinical assessment led to teeth whitening, gingivectomy, and composite restorations of #7 and #10. The composite resin was applied and layered to achieve optimal aesthetics. Shade matching, contouring, and surface texture replication were meticulously executed. The patient actively participated in the shade selection process to ensure personalized and satisfactory results.

Two peg-shaped maxillary lateral incisors were successfully rehabilitated with a gingivectomy and direct composite resin veneers. After treatment, patient had a smile with improved gingival heights and symmetry, leading to enhanced smile esthetics and facial harmony. The treatment choice of direct composite resin restorations also alleviated the patient of the financial burden of restoring peg laterals. The conservative approach of using direct composite restorations proved to be a successful for addressing peg lateral incisors. This case underscores the effectiveness of precision composite techniques in achieving both functional and cosmetic improvements.

30

Precision in Esthetics: A Digital Workflow for Implant Abutment Restoration in the Esthetic Zone Using CAD/CAM Technology- case report

Tempel A, Elgendy H.

School of Dental Medicine, East Carolina University

This case report outlines the digital workflow employed for the restoration of an implant abutment in the esthetic zone, emphasizing the use of CAD/CAM technology to achieve precise and aesthetically pleasing results. A 69-year-old patient presented with a missing maxillary lateral incisor in the esthetic zone and opted for implant-supported restoration. The digital workflow began with intraoral scanning and virtual implant planning. Utilizing computer-aided design and computer-aided manufacturing (CAD/CAM) technology, a customized provisional abutment was designed digitally. The design data were then transferred to a milling machine for fabrication. The provisional restoration was seated using Telio® CAD for CEREC® Abutment Blocks for better healing, visualization, and profile developments of single-tooth implant-retained hybrid restorations. Adjustments were made chairside to ensure optimal fit and esthetics. The digital workflow facilitated precise planning and execution of the implant abutment restoration. The utilization of CAD/CAM technology in the digital workflow for implant abutment restoration in the esthetic zone proved to be efficient and yielded aesthetically pleasing results. The ability to digitally design and fabricate custom restorations enhances precision and allows for optimal customization, contributing to successful outcomes in implant dentistry. This case highlights the advantages of incorporating digital technologies in the treatment planning and execution of implant-supported restorations in the esthetic zone.

31

Diagnosis and Conservative Treatment Approaches to a "Gummy Smile" – Case report

Herring SE, Elgendy H.

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Appearance of a “gummy smile” is a relatively common chief complaint for patients to have when presenting for comprehensive dental care. The aim of this case report is to describe the diagnosis and conservative treatment approaches to a "Gummy Smile" using CO2 laser in a gingivectomy on a 25-year-old female patient concerned with her smile showing too much gingiva. The patient presented with excessive gingival height in her upper anterior teeth in combination with a high smile line. A comprehensive clinical

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assessment led to the selection of laser gingivectomy due to its advantages in precision and reduced post-operative discomfort. A digital smile design workup was completed to plan out the new gingival height and contours. With the use of a CO2 laser, 1.5-2mm of gingiva was contoured on teeth #6-12. The patient reported minimal discomfort post-operatively, and the healing process was uneventful. Follow-up evaluations demonstrated a significant improvement in the patient's smile aesthetics. This case highlights the efficacy of laser gingivectomy as a viable and patient-friendly option for correcting gummy smiles, offering enhanced precision and reduced recovery times compared to traditional methods.

Scholarship of Teaching/Mentoring

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The Lewis Collaborative in Pediatric Dentistry: A One Year Review

Webb MD, Moss ME.

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The aim of this presentation is to provide a one year follow up on the effectiveness of the Lewis Collaborative in Pediatric Dentistry. The Lewis Collaborative in Pediatric Dentistry, a one-year program for general dentists to increase their knowledge and skills in treating children. The Collaborative is also designed to increase the number of children that the participants are comfortable treating. The program consists of three modules that are progressively more complex. A survey instrument was given at the end of each module to assess their comfort level in treating various pediatric dental problems. The results of the surveys show that as the participants went through the program they became more comfortable treating more complex pediatric dental problems. The Lewis Collaborative in Pediatric Dentistry increased the knowledge and skills of the participants. Further follow up is needed to assess if this has resulted in a greater number of children treated in the community.

33

Predoctoral Pediatric Dentistry Rotation and Post-Graduation Confidence in Treating Pediatric Patients: A Qualitative Interview Study

Howard E, Tucker N, Moss ME.

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This study assesses the predoctoral pediatric dentistry rotation at ECU, aiming to identify strengths and weaknesses perceived by third- and fourth-year dental students. Through one-on-one interviews, the research seeks to inform curriculum enhancements, ultimately contributing to the preparation of more confident general dentists for pediatric patient care. The study, conducted at East Carolina School of Dental Medicine, involved eight randomly selected predoctoral dental students. Participants were categorized into two groups for interviews assessing their thoughts, attitudes, knowledge, and comfort in treating pediatric dental patients:

Group #1 comprised 3rd-year students with pre-rotation interviews

Group #2 included 3rd and 4th-year students with post-rotation interviews

Audio-recorded interviews were transcribed and cross-analyzed using Nvivo software, facilitating a comprehensive qualitative data evaluation. Thematic analysis identified and coded themes related to students' experiences, attitudes, and confidence in diagnosing and treating pediatric patients.

The thematic analysis of Group 1 consisted of 4 ECU predoctoral students entering rotation or mid rotation were the following:

- Majority had no intention of specializing in pediatric dentistry (except for one student who has considered pediatric dentistry, but not yet decided.)

- 3 of the 4 participants had a bad childhood experience at the dentist, all being a general dentistry office.

- All participants in Group 1 plans on treating pediatric patients' post-graduation.

- 2 of the 4 participants had limited exposure to caring for children in and out of the dental setting in the past.

- The overall feeling toward treating children was fear of unpredictability of patient, lack of time for behavior management tools, inability to connect and talk to young patients and lack of confidence in knowledge and skills of pediatric dentistry.

- A theme of referral factors was poor behavior, a complex treatment plan and young children (5 years or younger)

- All participants felt being fast was the most important skill to have treating pediatric patients and all participants said being able to render treatment fast was their weakness.

- All participants identified their weaknesses being time management and behavior management.

- Majority of participants look to their peers to navigate challenges

- A common theme revealed, was the high stress level in the pediatric clinic and the inability to learn. Many participants voiced being in "survival mode." While in rotation.

The thematic analysis of Group 2 is still being conducted and consists of 4 ECU predoctoral students who have completed their pediatric dental rotation and/or CSLC external rotation were the following:

- 2 participants completed pediatric rotation and CSLC, both having pediatric patients at CSLC.

- Both participants do not intend on specializing in pediatrics

- Both participants had good childhood experiences at the dentist, all being a pediatric dental office.

- All participants plan on treating pediatric patients' post-graduation.

- 2 participants felt they had a better experience treating pediatric patients at the CSLC sites.

- The overall feeling toward treating children was comfortable depending on age and maturity of patient, complexity of treatment and amount of treatment needed.

- A theme of referral factors was the same as Group 1 being poor behavior, a complex treatment plan and young children (5 years or younger)

- All participants felt being fast and entertaining for a child were skills needed.

- All participants identified their weaknesses being connecting and talking to an anxious child.

- All participants felt comfortable asking CSLC attending to navigate challenges.

- A common theme revealed, was after attending CSLC they felt for comfortable with pediatric dentistry because of the decrease in stress level and more time with the patient.

Majority of the interviewed students lack experience with children and go into pediatric dental rotation with feelings of anxiety and stress, with little intention of specializing in pediatric dentistry. But all participants understand and are willing to examine and treat pediatric patients' post-graduation, with the factors of behavior, age and treatment complexity based on possible referral to pediatric dentistry. A theme of participants having bad experiences as a child at the general dentist office influenced their opinion that receiving treatment at a pediatric dental office is better for the patient's psych. A trend of learning environment of participants undergoing ECU rotation and those who have completed CSLC were drastically different in correlation to stress levels, time constraints and number of duties

impeding the ability to learn at ECU rotation vs CSLC that eliminated these factors and increased learning ability.

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What Research Should Be Done at ECU SoDM? Faculty, Students, and Staff Weight In

Vieira AR.

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Service is at the heart of the mission of East Carolina University and ECU's School of Dental Medicine (SoDM). As the only university in North Carolina with a medical school, a dental school, and a college of engineering, Ecu is leading the way in creating important discoveries through research. SoDM prepares students who are inclined to serve rural and underserved populations. The state of North Carolina has funded the ECU SoDM by building stand-alone facilities called community service learning centers (CSLCs) in eight rural and underserved locations. SoDM has supported scholarly activities and after 15 years of existence and 11 graduate classes, and to further align with the ECU mission, is starting an explicit effort is developing a strong research enterprise. As part of the initial steps of implementing a cohesive and vibrant research program that is fully integrated with ECU's SoDM, other activities, faculty, students, and staff were asked what the priorities of the research program of ECU's SoDM should be. A single-question survey was created by Qualtrics and distributed to faculty, students, and staff, including the CSLCs. The script was: "For the last decade, ECU SoDM has solidified its presence in the state by providing excellent student experience and community services. As we seek to expand our research efforts in alignment with our mission, we want your opinion: what should be the research priority for ECU SoDM?"

PLEASE FRAME YOUR ANSWER AS A QUESTION:_____?

Participation by faculty was more robust than the participation by other stakeholders. Out of 76 faculty, 36 responses were obtained (47%). Fourteen students out of 206 available responded (7%), whereas 12 staff members out of 237 (5%). There were differences in the areas of research suggested by the three stakeholders. Faculty, more predominantly, mentioned two areas: building capacity to facilitate research by faculty and students (14 answers out of 36) and community/public health related research (10 answers out of 36). Students and staff more often suggest aspects of community/public health should be studied (seven answers out of 14 among students and seven answers out of 12 among staff). There is a general sense among the ECU's SoDM community that the research agenda to be developed by the school should focus on the community that the SoDM serves.

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Motivating Factors for Dental School Applicants

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The objective is to survey dental students to assess the motivating factor for students who applied to dental school. This pilot study will utilize current students at the East Carolina School of Dental Medicine. A survey instrument will be developed to assess motivating factors for their decision to apply to dental school. The results will show if there are motivating factors for applying to dental school that are common to the current students at the School of Dental Medicine. Conclusions will be based on the results of the survey.

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ADEA DEI (Diversity, Equity, and Inclusion) Leadership Institute Development Proposal

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The current workforce consisting of general dentists, specialists, dental hygienists, dental therapists, dental assistants, and dental laboratory technicians in academia is not very diverse and needs leaders in diversity, equity and inclusion that can drive diversity as a core component of excellence in dentistry and academia. The American Dental Education Association (ADEA) is a national organization that promotes academic dentistry. It is home to several research, advocacy, faculty, and leadership development initiatives, as well as a diversity of interwoven community experiences that allow members to pursue their individual goals while leveraging their collective strength. The workforce is the most in need to take DEIB trainings and Bias and Microaggression training as well with the purpose to create more inclusive environments and campuses around the country where minorities feel welcome. Establish and operationalize an ADEA-certified institute aimed at equipping leaders with the knowledge and skills necessary to advance Diversity, Equity, and Inclusion (DEI) within academic institutions. This objective includes developing comprehensive learning mechanisms that focus on organizational infrastructure, incorporating DEI as a metric of institutional excellence, fostering collaboration with stakeholders at all levels, and providing tools for the application of current research in the creation and execution of strategic plans for DEI. Additionally, the institute will address specific areas such as institutional strategic planning, cultural competency training, faculty recruitment, retention, and development, dentistry student admissions and diversity programs, and resident recruitment programs. While ADEA offers several professional development opportunities such as ADEA Enid A.N Scholar-in-residence program, ADEA Leadership Institute, ADEA Emerging Leaders Program, ADEA Academic Dental Careers Fellowship Program, ADEA International Women's Leadership Conference etc., currently, there are no development opportunities for advancement/formal recognition or endorsement in DEI. Studies have shown that the DEI Institute is one example of a successful method to creating inclusive learning environments and addressing health equity issues. Methodology employed for this study entailed a meticulous, comparative analysis research process, wherein a comprehensive and systematic exploration examination of pertinent websites was undertaken to discern and evaluate existing Diversity, Equity, and Inclusion (DEI) leadership training programs within academia relative to medical and dental field, allowing for the identification and comparison of contemporary DEI leadership training initiatives. Summary of key features, methodologies, and focal points of each training program, facilitating a nuanced understanding of their respective strengths and limitations. We propose the establishment of a Diversity, Equity, and Inclusion (DEI) Leadership Institute for dental schools, with the aim of enhancing their commitment to fostering diversity, equity, inclusion, and a sense of belonging within their programs. This initiative envisions sending potential leaders from dental schools to undergo specialized training in DEI principles, empowering them to return to their institutions equipped with the knowledge and skills necessary to train faculty and work force. This strategic approach is particularly beneficial for individuals who may be unable to attend the American Dental Education Association (ADEA) annual meetings or lack an extensive understanding of DEI matters.

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Young Innovators in Action: Unveiling the AI-Powered Caries Detection and Diagnosis - A review!

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The aim of this review is to report on the diagnostic accuracy and performance of AI-based modes designed for detection, diagnosis, and prediction of Dental caries. Search Strategy: Eminent electronic databases (PubMed, Google scholar) were searched for relevant articles that were published from January 2023 until January 2024. The literature search was based on the Subject Headings terms like dental caries, tooth decay, cavity, diagnosis, detection, prediction, artificial intelligence, machine learning, deep learning (DL), automated system, convolutional neural networks (CNNs), artificial neural networks (ANNs) and deep neural networks (DCNNs) Study Selection: Article selection was conducted in two phases. During the initial phase, articles were selected based on the relevance of the title and aim. In this phase, the article search was done, and this process generated 38 articles. These articles were further screened to eliminate the duplicates, ultimately leading to the exclusion of 31 articles. The remaining 7 articles were evaluated based on the eligibility criteria. Eligibility Criteria: Inclusion Criteria: In this systematic review, the articles were included based on being original research articles reporting on application of AI-based models in diagnosis, detection, and prediction of Dental Caries. Exclusion Criteria: The articles excluded were (a) Articles with only abstracts, without full text availability, (b) Conference proceedings, commentaries, editorial letters, short communications, review articles and scientific posters uploaded online, (c) Articles published in non-English languages. Keywords: Random Forests, Reinforcement learning, Generative adversarial networks (GANs), Support vector machines (SVMs), Semantic Segmentation, Self-Supervised learning, Capsule Networks – Caps Nets, Federated Learning, Multimodal Learning, Machine learning and image recognition in dental caries, ICDAS, CaMBRA, YOLO, Blob detection, AssistDent®: AI-assisted dental diagnostics. AI models have shown remarkable success in predicting, detecting, and diagnosing dental caries (DC). These models offer excellent performance, making them valuable in clinical practice for identifying individuals at higher risk of Dental Caries. Their use enhances diagnostic accuracy, treatment quality, and overall patient outcomes. Predictive models' results can inform the planning of preventive dental care, aiding in the design of oral hygiene and dietary plans for individuals with a high risk of DC. These AI models can serve as supportive tools for dentists in clinical settings and assist non-dental professionals, improving DC detection and diagnosis accuracy in schools and rural health centers. Despite their outstanding performance, limitations exist in the size and heterogeneity of the datasets in reported articles, necessitating additional training and validation for optimal performance.

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Unveiling ASDA's Impact through Advocacy, Events, and Leadership Opportunities

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The poster presentation aims to provide an overview of the American Student Dental Association (ASDA), its role in advocating for dental students, and the various events and leadership opportunities it offers. Organizational Insight: A comprehensive overview of ASDA, illuminating its organizational structure and the intricacies of its dynamic three-tiered leadership system. Institutional Leadership: Unveiling the distinctive role of ECU ASDA within the institutional leadership framework of ASDA, highlighting our pivotal contribution. Advocacy Chronicles: A narrative detailing ASDA's impactful advocacy efforts and its influential participation on both national and district leadership platforms.

Explanation of ASDA's mission and focus on the rights, welfare, and interests of dental students. Discussion of ECU ASDA's engagement in conferences, events, and initiatives. Overview of the impact of ASDA on dental education and profession. We provide a resonating summary of ASDA's indelible mark in fostering advocacy, nurturing community bonds, and cultivating visionary leadership among the dental students at East Carolina University, School of Dental Medicine. Charting excellence, ASDA stands as a beacon of inspiration for the dental professionals of tomorrow.

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Pediatric oral health and caregiver oral health literacy: A systematic review

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The objective of this review is to systematically evaluate all known scientific literature worldwide to date in order to determine whether there is compelling evidence for an association between the oral health status (OHS) of children caregiver oral health literacy (OHL). All bibliographic databases with salient information on the proposed question were evaluated and included biomedical research literature (MEDLINE via PubMed and Embase), allied health, nursing and dental literature (CINAHL Complete), and social sciences/scientific literature (SCOPUS). We have also undertaken a grey literature search for additional articles or abstracts. The subject terms and keywords assessed for the main concept domains included: oral health literacy, oral health, caregivers, and children. A comprehensive list of search terms was iteratively developed by the team, and peer reviewed by a second librarian. After removing duplicate works, 4,704 studies were screened at the title and abstract level by at least two independent reviewers. Five hundred twenty-four studies were identified for the full text screening. At least two independent team members completed 80 full text reviews, with 13 articles meeting the specified inclusion criteria. For articles that did not meet the inclusion criteria within the full text review, the most common reason for exclusion is that they did not specifically address both caregiver OHL and OHS of children, diagnosed by a dental professional. Of the thirteen full text articles meeting the established criteria, a supermajority indicates a clear pattern of association between caregiver OHL and OHS of children. These studies were carried out in Australia, Brazil, Hong Kong, Iran, Malaysia, Senegal, and the United States, representing 5 continents. Based on this global literature search, there is an association between caregiver OHL and children OHS across diverse regions. This means that as caregiver OHL increases the OHS of children improves over time.

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The Impact of the LGBTQIA+ Dental Organization on Ross Hall's Dental School Community

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The LGBTQIA+ Dental organization has been seamlessly integrated into Ross Hall with the primary goal of fostering a supportive and inclusive community for students, faculty, staff, and alumni. This initiative is designed to transcend traditional boundaries related to sexual orientations, gender identities, and

gender expressions, providing a platform for individuals to connect and thrive. The overarching objectives include promoting leadership among students and creating collaborative opportunities that enrich their educational experience. The organization has strategically implemented a variety of programs and initiatives to achieve its objectives. These include support groups, educational workshops, and awareness campaigns aimed at promoting a more inclusive environment within the dental school community. The implementation of inclusive language is a key component, ensuring that all gender identities, expressions, and sexual orientations encountered in everyday life are acknowledged and respected. The LGBTQIA+ Dental organization has successfully contributed to a heightened awareness within the dental community. By fostering an environment that embraces diversity, the organization has played a pivotal role in recognizing and dismantling LGBTQIA+ related stigma and discrimination. This, in turn, has positively influenced patient care, provider relationships, and the overall perception of the dental field. Furthermore, the organization's commitment to supporting individuals in their journey of self-identity has proven to be instrumental in building trust among members of the dental community. The inclusive and accepting atmosphere created by the organization has facilitated the formation of foundational relationships crucial for personal and professional growth. In conclusion, the LGBTQIA+ Dental organization has become an indispensable asset to Ross Hall's Dental School. Its impact extends beyond mere awareness, as it actively contributes to the elimination of stigma and discrimination. The organization's emphasis on inclusive language, support groups, and educational initiatives has created a more welcoming environment, fostered trust, and built essential relationships. As a result, the dental school community is not only more informed but also more compassionate and united.

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Perinatal Oral Health Program – Schweitzer Fellowship

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Many perinatal providers and pregnant women are uneducated on the importance of dental health in relation to healthy pregnancies, and how the oral cavity is altered during pregnancy. Research reveals that poor oral health is linked to poor birth outcomes such as preterm birth and low birth weight. Our program is to improve the oral health of pregnant women. This involves educating prenatal professionals on the importance of oral health within comprehensive care, as well as hosting oral health classes within the pregnant community. Prenatal Oral health classes were conducted at the Wayne County Pregnancy Center. A pre-survey was presented to participants before education, and a post-survey was provided after education. This allowed us to assess changes in attitude towards oral health and gain in knowledge. Prenatal Oral Health Education and training on how to conduct an oral health screen were provided to ECU Health Ob/Gyn residents and to the Pitt County Health Department Nurse-Family Partnership. Post survey data was obtained to assess the likelihood of implementing patient oral health education and screenings. Women who participated in the Wayne County pregnancy classes showed a positive increase in attitude towards oral health. Also, a willingness to change behavior within themselves as well as providing proper oral care at home for their children. Residents were receptive to the information considering they receive minimal oral health education within their programs. Post surveys revealed willingness to implement oral health within comprehensive care of their prenatal patients. The Perinatal Oral Health Program received positive feedback from both the prenatal providers and oral health class participants. Evaluation through pretest and post test scores indicates that all professional categories have gained knowledge in perinatal oral health. Further studies would explore whether professionals actively incorporate oral health into prenatal care and promote collaborative practices by facilitating connections for pregnant women to access care.

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Use of Virtual Applications in Anatomy Education: Outcomes and Student Perspectives

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As gross anatomy requires significant memorization and spatial comprehension, it was hypothesized that access to a virtual application with human radiographic scans would improve comprehension and retention of material. IRB approval was obtained. The control group consisted of D1 students in the class of 2025, and the experimental group consisted of D1 students in the class of 2026. In addition to existing resources including a virtual anatomy atlas generated from computer images, the experimental group was also provided access to a 3D anatomy application generated from volume rendered CT and MRI scans (BodyViz). Each subject took 3 assessments, including a pre-laboratory quiz, didactic exam, and a retention quiz. For each subject, the following anonymized data was considered: assessment scores, demographic data, and mean Dental Admissions Test (DAT) score. Data analysis was performed using IBM®SPSS. Mean assessment scores were compared within and between the control and experimental groups with DAT score treated as a covariate. Qualitative data was analyzed for patterns within the responses. The control and experimental groups were highly similar in terms of demographic variables. An overall comparison of the control versus experimental groups was precluded by the fact that the assessment score profiles of the groups were not parallel. For either virtual application, the most reported helpful feature was the ability to help "visualize" structures discussed in class. Negative feedback reported either technical difficulties in opening the application(s) or difficulty in navigating through the features of the application(s). The control and experimental groups were highly similar in terms of demographic variables. An overall comparison of the control versus experimental groups was precluded by the fact that the assessment score profiles of the groups were not parallel. For either virtual application, the most reported helpful feature was the ability to help "visualize" structures discussed in class. Negative feedback reported either technical difficulties in opening the application(s) or difficulty in navigating through the features of the application(s).

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Development of Opportunities for Research (DOOR): Future Academic Interdisciplinary Workforce and Collaborators for the National Dental Practice-Based Research Network (PBRN)

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The University of Florida (UF) College of Dentistry and East Carolina University (ECU) School of Dental Medicine are collaborating to establish an academic multidisciplinary practice-based research network within and between their respective dental schools. The aim of this project is to provide clinical

faculty, residents, and predoctoral students with a competency-based training program for skills development, research mentorship, and participation in practice oriented clinical research. There is a need in dental education to promote research skills training and experiences and to integrate these processes with interprofessional education and transdisciplinary research. This project is designed to foster culture change to embrace research as a critical component of both dental education and dental practice. A teams-based science curriculum in clinical research skills development and mentoring will be delivered to UF and ECU DOOR participants. Two research studies that will be conducted across the two schools with common databases: 1) diabetes detection chairside (Advancing Prediabetes/Periodontal Research in Oral Academic Clinical Healthcare; APPROACH); and 2) pain conditions affecting dental treatment (Chronic Overlapping Pain Evaluation Study; COPES). This UF-ECU initiative is one of ten U01 collaborations funded by NIDCR for the next five years. The first cohort of 6 dental students, 6 residents, and 6 clinical faculty participants is being recruited to begin the DOOR program in the Fall 2024 at both UF and ECU. Similar cohorts will be recruited, trained, and assessed for research competencies and related outcomes each year through 2028. This project will leverage the resources of UF as a research-intensive dental school to promote a pipeline of dental students and residents at both UF and ECU who are engaged with clinical research. As a newer dental school, ECU will advance its research activities and lend its resources, adding to the diversity in this initiative. For both institutions, the resources of the UF Clinical and Translational Science Institute will be harnessed for research training and implementation, also relying on UF's experience with the National Dental PBRN. The DOOR collaboration between UF and ECU is designed to train the future workforce for National Dental PBRN and strengthen the research cultures at the two participating institutions.

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An Analysis of Oral Hygiene Instruction Education and Intervention at a Special Healthcare Facility

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Special Care individuals are an incredibly vulnerable population when it comes to oral health and oral health preservation. Caregivers and families of these patients play an integral role in the cultivation of certain beliefs, attitudes, and knowledge that society may have towards the oral health care and oral health routines of these individuals. Ensuring adequate dental literacy and efficient oral health habits of caregivers and thus familial caretakers is an integral step in moving towards more optimal oral health worldwide. The aim of the present project is to explore the shift in oral health attitudes, behaviors, knowledge, and the perception of the caregivers and familial caretakers of special care patients at the Howell Center after the integration of an educational oral health instruction orientation tailored towards special care individuals. A series of instructional videos and educational material was developed with information on the establishment and upkeep of proper oral hygiene routines for the special care patients at the Howell Center. The instructional video will then be shared with current caretakers at the center and subsequently integrated into the onboarding process for caregiving staff. The cross-sectional study will be conducted through a Self-Administered Questionnaire (SAQ). The SAQ is a questionnaire that explores caregivers' personal habits, as well as knowledge and attitudes on oral health after taking the training course. A myriad of caregivers in different departments of the Howell center were invited to complete the pre-survey SAQ, followed by the video training, followed by an immediate post survey SAQ to gauge knowledge and learning. Descriptive statistics will be used to analyze data. Project is in analysis stage and results will be analyzed via RedCap this week.

Basic and Materials Research

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Covalent Conjugation of 2-Hydroxyethylmethacrylate with an Anti- Biofouling 2-Aminoimidazole Small Molecule

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Secondary caries, or cavities that have re-infected previously restored teeth, are a prevalent problem in the oral health community. An overwhelming 74% of restored teeth require further work and replacement restorations; many of which are due to patient's lack of oral hygiene and knowledge.1 Often, the initial carious tissue is due to lack of oral hygiene and after procedural restorations, no changes occur in their daily routine. This certainly contributes to the replacement rate; however, the remaining portion is due to the lack of preventative measures in the current methacrylate resin composite materials clinically utilized. Thus, there is a critical need to produce a dental adhesive with preventative characteristics. Which can reduce the high-rate replacement for such materials. To create such a dental adhesive, a 2-aminoimidazole (2-AI) motif derived from sea sponges that has shown capabilities of disrupting bacterial biofilms has been chemically conjugated to 2-hydroxyethyl methacrylate (HEMA, 1), a methacrylate commonly used in dental adhesives. Briefly, boc-protected 2-aminoimidazole (8) was coupled to a commercially available alkyne using standard conditions of amide formations. In the key step of the synthesis, the alkyne (9) was subjected to a "click" reaction with the known azide (3) and pushed through HPLC for separation. Under the pressure of HPLC and the presence of TFA, the product was deprotected and the final product was prematurely synthesized. At this stage, the solid functionalized methacrylate product (10), was incorporated into a control group polymer blend to produce an experimental dental adhesive. When co-polymerized at 1mM concentration, no significant differences in the mechanical properties were determined between control, commercial and experimental groups. The polymer also displayed similar degrees of conversion amongst groups and were slightly increased compared to literature values of the commercial adhesive Clearfil SE Protect. Additionally, the new monomer showcased anti-biofouling properties, however, when incorporated at 10 mM concentration into the polymer blend, no bacterial depletion was noted.

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Renin-Angiotensin-Aldosterone System on Cardiomyocyte and the Impact of Anti-Hypertensive Drug on Myocardial Excitability

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The objective is to study the expression of RAAS receptors on ventricular myocytes isolated from hypertensive rodents to assess the implication of the AngII in the presence or absence of antihypertensive drugs. Hypertension is a polygenic condition that characterizes one of the most common and relevant cardiovascular complications that contributes to approximately 690,000 deaths per year in the United States. Renin-angiotensin-aldosterone system (RAAS) plays a significant role in systemic and neurogenic hypertension. Angiotensin II (Ang II), an octapeptide, is a key hormonal peptide that interacts

with AT1 and AT2 G-protein-coupled receptors (GPCR). The effects of AT1R mediate excitatory responses, and AT2 serves as the protective arm of RAAS at the level of cardiomyocytes. Angiotensin-converting enzyme-2 (ACE2) converts AngII into Ang-(1-7) mediated by MAS receptor, a GPCR for Ang-(1-7), to mitigate myocardial excitation and regulate blood pressure. Angiotensin 1-7 (Ang 1-7) has been shown to reduce blood pressure, cardiac contractility, and reactive oxygen species (ROS), mediated via MAS1 proto-oncogene protein (MAS). There was a correlation in the circulating plasma AngII with blood pressure in hypertensive rodents. The blood pressure was reversed with angiotensin receptor blocker (ARB) suggesting the impact of RAAS. Cardiac expression for AT_1R showed a significant increase compared to the control group ($p<0.001$) but was abolished in the treated group with angiotensin receptor blocker (16mg/kg candesartan) and a vasodilator (10mg/kg di-hydralazine). Conversely, AT_2R expression in hypertensive group was significantly lowered compared to control group ($p<0.001$). However, the antihypertensive drug treatments did not reverse AT_2 response to control level suggesting a non-reversal of AT_2 receptor expression when blood pressure is returned to normal. Furthermore, there was a significant decrease in the protein expression of MAS receptors for angiotensin 1-7 (Ang1-7) peptides but was returned to control levels in the treatment group. These results suggest that while AT1R mediates excitability and enhancement of cardiac contraction in hypertensive condition, MAS receptor mediates the metabolite of AngII, through Ang1-7 and, along with AT2 receptors to serve as the protective arm of angiotensin peptides. This work implies that changes in the expression of the receptors on the surface of the cells are a key mechanism involved in the signaling pathways that lead to the manifestation of hypertension. It also suggests that treatments for hypertension works by restoring receptor expression to basal level.

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A Comprehensive Study on Cardiac Receptor Dynamics in Hypertension – Role of Renin-Angiotensin System in Cardiomyocytes

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The (mRen2)27 transgenic rat model of hypertension, characterized by the over-expression of the mouse Ren-2d gene in the brain and adrenal gland and a reduction in kidney renin, provides a valuable tool for studying the neural control of arterial pressure. However, the mechanism responsible for the implication of Angiotensin II (AngII) in the presence or absence of antihypertensive drugs and the RAAS receptor dynamics in the genetic form of hypertension is not well understood. The present study aims to bridge these gaps in our understanding by investigating the role of RAAS in hypertension, with a focus on receptor dynamics and cardiac function in rat hearts. Previous studies in Superior Cervical Ganglion (SCG) concluded that Angiotensin II (AngII) is modulated through AT1R causing a chain reaction that leads to high blood pressure. Studies also show that Candesartan, an Angiotensin receptor blocker, has the opposite effect of AngII-induced synaptic transmission in SCG. We hypothesize that alterations in the expression of receptors on the surface of cells constitute a key mechanism involved in the signaling pathways that culminate in the manifestation of hypertension and cardiac contractility. Experiments were performed in male Hannover Sprague-Dawley (HnSD) and Male hemizygous hypertensive (mRen2)27 transgenic rats (12–16 week old). The blood pressure was measured by Non-invasive blood pressure was taken via tail-cuff plethysmography (NIBP-8; Columbus Instruments). The left ventricle of (mRen2)27 transgenic and Hannover-Sprague Dawley (HnSD) rats was isolated. The protein was used for Western blotting analysis and the RNA isolated was used or qRT-PCR. Data are expressed as means±SEM and range unless otherwise noted. Sample means are compared using paired or unpaired Student's t-test statistics when only two variables are compared and differences between multiple means were analyzed for significance using a one-way analysis of variance (ANOVA) with Tukey post hoc analysis. Simple linear regression was used to determine the relationship between various parameters of AngII-induced changes in the left ventricular myocytes. Means were considered to differ significantly if P values were lower than 0.05. Protein expression and mRNA profile for AngII receptor subtype-1 (AT1R) showed a significant increase compared to the HnSD. There are significant decreases in the protein expression for G protein-coupled receptor (GPCR); the MAS1 proto-oncogene protein (MAS) and AngII receptor subtype-2 (AT2R) in the (mREN2)27 transgenic strain compared to HnSD group. The MAS receptor mediates the metabolite of AngII; the Ang1-7 along with GPCR-coupled AT2R suppress the enhancing effect of AngII. These results suggest that AT1R mediates sarcolemmal excitability and coupling contraction in hypertension, the MAS receptor along with AT2 receptors serves as the protective arm of AngII. Further, there was an increase in protein expression for membrane-bound NKA isoforms and it is believed to have triggered an influx of calcium ([Ca2+] i) through NCX. Gene expression PCR report for NCX showed an increase in transcription profile while the key regulators of cellular calcium homeostasis, SarcoEndoplasmic Reticulum Calcium ATPase (SERCA) pump showed a significant diminution in the gene transcription profile for SERCA, suggesting a reduction in Ca2+ reuptake in RAAS-mediated hypertension. The increases in protein expression for membrane-bound NKA, NCX and diminished intracellular SERCA2a activities for Ca2+ re-entry in hypertension suggest that NKA isoforms caused a surge in intracellular Na+ leading to Na-Ca cationic exchanger system to increase [Ca2+]i influx. Ca2+-linked RYR receptor depletes Ca2+ stores from the sarcoplasmic reticulum thus, the calcium-induced, calcium-released (CICR) in the intracellular space enhances contractility. Furthermore, the diminished expression of SERCA2a minimizes the ability for Ca2+ reuptake and, therefore, enhances contractility and excitation-contraction coupling in hypertension. The circulating plasma AngII stimulated myocardial RAAS receptors via AT1R but the diminished protein expression for MAS1 proto-oncogene receptor – a protective arm of Angiotensin peptides, supports myocardial excitation–coupling in the mREN transgenic model of hypertension. The study explored the basic understanding of myocardial dysfunction in hypertensive episodes that may lead to the identification of pharmacological tools for treatment options and/or preventative measures for hypertension.

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Treatment And Eradication of Helicobacter Spp. In TGR (mREN2)27 Transgenic Rat Breeding Colony Does Not Alter Hypertensive Phenotype

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The transgenic homozygous (TH) rat strain, TGR (mREN2)27, is severely hypertensive. Without treatment, survival rates past 20 weeks of age are only 20% for males and 50% for females. Losartan-treated TH male rats are mated with normotensive female Hannover Sprague-Dawley (HnSD) rats to produce less hypertensive hemizygous (HEMI-) TGR (mREN2)27 rats with systolic blood pressure (SBP) 180-200 mmHg for

females and males at 20 weeks of age, allowing experimental study without antihypertensive treatment. Helicobacter species infection, which in rodents causes gastro-intestinal and hepatic disturbances and inflammation, compromised immunity and decreased breeding success, was detected in our TH and HnSD breeding colonies. Eradication improves animal health and breeding outcomes. However, the effects of Helicobacter diet treatment on phenotypic characteristics of the HEMI-TGR (mREN2)27 are unknown. TH and HnSD rats from the original WFSM colony were isolated and treated in a clean room for 8-12 weeks with Mouse Diet, Helicobacter 4 Drug Combo (Bio-Serv., Frenchtown, N.J.; pelleted diet containing 3.0 mg Amoxicillin, 0.5 mg Clarithromycin, 1.0 mg Metronidazole, 0.02 mg Omeprazole per 5 grams). Eight male and six female offspring from TH X HnSD rats and five male and six female offspring from HnSD X HnSD rats from Diet-treated parents with confirmed infection eradication had tail-cuff SBP measured at 20 weeks of age for comparison with rats from the original non-treated colony. The SBPs were similar between control and treated female HEMI-TGR (mREN2)27 (191±8 vs 184±7 mm Hg) and between control and treated male HEMI-TGR (mREN2)27 groups (194 ± 4 vs 182±3 mm Hg). Also, SBP was not different between female or male, control vs treated, HnSD rats (Female: 130±6 vs 121±5 mm Hg; Male:130±1 vs 136±5 mm Hg). Consistent with previous studies, male HEMI-TGR (mREN2)27 rats weighed significantly more than male HnSD rats (516±10 vs 454±16g, $p<0.01$), while female mRen and female HnSD were similar (280±8 vs 255±4 g). Helicobacter treatment and eradication in homozygous parental TGR and HnSD lines did not alter the hypertensive phenotype in HEMI-TGR (mREN2)27 rats, nor changed the normotensive phenotype of HnSD rats.

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Neuroimmune mechanisms of Rab10 implicated in resiliency to Alzheimer's Disease

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A rare functional variant in the small GTPase Rab10 (rs142787485), that leads to reduced expression and activity was found to confer resilience against Alzheimer's disease (AD). Our goal was to identify mediators of Rab10-dependent neuroresilience using Rab10 deficient (Rab10+/-) mice. Animals: Rab10+/- and Rab10+/+ mice (5 /genotype; both sexes; aged 6-7 months). Evaluation of homeostatic neuroimmunity: immunofluorescence staining for microglia (Iba1) and astrocyte (GFAP) markers Evaluation of peripheral immunity: phenotyping of splenic immune cells by flow cytometry Oligomer preparation: Aβ1-42 and scrambled Aβ peptides (AnaSpec) incorporated in oligomers Hippocampal slices and treatments: cut at 400 µm thickness; cultured on Millicell inserts in 6-well plates; treated at DIV7 with 500 nM of oAβ1-42 or scAβ Assessment of cytokine release from hippocampal slices into culture medium: performed with a Immune Monitoring 11-Plex Mouse ProcartaPlex™ Panel kit; sample reading performed on a Luminex 200 system. In the hippocampus of Rab10 +/- mice, the baseline activation of the microglia was significantly reduced, while no significant difference between genotypes was observed for astrocytes. In the spleen of Rab10+/- mice the % of natural killer (NK) cells was significantly reduced. There was no difference between genotypes in total numbers of CD8 and CD4 lymphocytes. The % of CD8 effector cells was significantly lower and the % of CD4 effector cells was significantly higher in Rab10+/- mice. Treatment of hippocampal slices with oAβ1-42 lead to a significantly lower release of IL1-β, TNFα and IFNγ from Rab10+/- hippocampal slices compared to Rab10+/+ slices. Our data suggest a role for Rab10 in innate immunity that has been shown to contribute to the progression of neurodegeneration. By attenuating neuroinflammation and modulating immune cell phenotypes, Rab10 reduction is a promising therapeutic avenue for prevention or treatment of AD.

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Development of novel molecular optogenetic tools to study Hirano body formation in neurons

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Abnormal neuronal cytoskeleton dynamics is a common feature of neurodegenerative disorders including Alzheimer's disease (AD). Hirano bodies (composed of filamentous actin and actin-binding proteins) are neuronal inclusions associated with aging and universally present in the AD brain, particularly in the hippocampus. This study focuses on understanding the involvement of actin-ATP interactions in cytoskeletal anomalies and their role in neuronal inclusion formation during normal aging and aging-related disorders.

DNA constructs: Point mutations (G158L, S14V, K18A and D154A) were introduced into Actin in a pNic28 plasmid using site directed mutagenesis, followed by subcloning into the Cib.GFP mammalian expression plasmid (phCMV-GFP). Primary neuron cultures and transfections: Dissociated cortical neuron cultures were prepared from E18 mouse embryos (CD1) following our published protocol (Bunner et al., BioProtocol, 2021) and cultured in 6-well plates with coverslips at 500K/ml density. Neurons were transfected with 5 µg plasmid/well on DIV5 using Lipofectamine LTX reagent. Fixed neuron experiments: 48-72 hours post-transfection neurons were fixed and immunostained for MAP2 or tau following standard our published protocol (Salem, Bunner et al., JBC, 2020). Imaging: Confocal images were obtained on a Zeiss LSM 800 microscope with Airyscan. Particle analysis: Images were analyzed using FIJI equipped with the BioFormats package. Distinct cytoskeletal phenotypes were associated with specific mutants. G158L and S14V lead to cofilin-actin rod phenotype with structural destabilization reminiscent of pathological actin-cofilin rods in neurodegeneration. Mutants K18A and D154A exhibited large cluster phenotypes, similar to Hirano bodies, with dramatic impacts on actin subcellular distribution. These results highlight the critical role of the actin-nucleotide binding pocket in regulating actin function. This work provides insights into the role of actin-ATP interactions in cytoskeletal anomalies observed in neurodegenerative diseases and lays the groundwork for further biochemical characterization and potential therapeutic strategies targeting aberrant cytoskeletal dynamics.

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Interferon lambda modulates the wound healing process of gingival keratinocytes in vitro

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Periodontitis is a common, chronic inflammatory disease caused by microbial dysbiosis in a susceptible host. Scaling and root planning (SRP), a routine treatment modality for periodontitis disrupts epithelial integrity transiently. Previous studies have reported increased level of interferon lambda (IFNL) in gingival crevicular fluid following SRP. Interestingly, periodontitis patients who smoke exhibit significantly lower IFNL expression in the crevicular fluid compared to periodontitis patients who are non-

smokers. Cigarette smoking is considered to impair epithelial barrier function and cell-cell contact recovery. As IFNL promotes wound closure of colitis, a chronic inflammatory condition of the gastrointestinal tract, it was hypothesized that IFNL is involved in the wound healing process of the gingival epithelium, where cigarette smoking negatively impacts. This study aims to determine the effect of smoking on the wound closure rate of human primary gingival epithelial cells, and the therapeutic potential of interferon lambda in the oral mucosal wound healing in vitro. The human primary gingival keratinocytes (PGK, PCS-200-14™, ATCC®) were grown on 24-well culture plates with cell inserts (Culture-Insert 2 Well 24, ibidi®) in the culture medium with or without cigarette smoke condensate (CSC, Fisher Scientific) for 24 hours prior to the artificial wound creation on the cells. After the wound creation, PGKs were imaged every 15 minutes for 24 hours with Zeiss CellDiscoverer 7 equipped with temperature and atmosphere controls at Cellular Analysis/ Imaging Core Facility at ECU Brody School of Medicine. Captured images were analyzed to estimate the speed of wound closure (μm2/day) via Wound Healing Fast Track AI Image Analysis (MetaVi Labs). The difference in the speed of wound closure will be compared between cells treated with CSC and vehicle. Statistical analysis was performed using unpaired student t-test with a p value of 0.05. Wound closure speeds for hPGK treated with 1, 10, 50, 100 and 500 μg/ml CSC were statistically significantly slower than with vehicle treated cells. Protein and gene expression analysis will provide association between wound closure speed and IFNL expression (data is in process). The future plan is to address the effect of exogenous application of IFNL to assess the wound closure speed of hPGK and possible therapeutic application of IFNL for accelerating the wound closure in vitro. CSC negatively affects the wound closure rate of hPGK, and it is expected that this is correlated with the decreased level of IFNL expression in cells treated with CSC.

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Acrylamide based Universal Adhesive with H10

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Cariogenic biofilms and esterase originated from bacteria or saliva are relevant factors linked with failure of tooth-colored, resin composite fillings. The former, releases lactic acid that demineralize tooth structures, and the latter breakdown the ester bond present in polymerized methacrylate-based resin composites. Collectively, they create new cavities at the margins of the filling, i.e., secondary caries (SC). The aims of this study were to 1) determine the degree of conversion, and 2) S. mutans biofilm inhibition of an experimental acrylamide-based universal dental adhesive containing 2-aminoimidazole compound (2-AI-H10) and a commercial dental adhesive containing chlorhexidine. Experimental Design: the acrylamide-based universal dental adhesive system was comprised of HEAA, 10-MDP, BisGMA, UDMA, CQ, Ethanol and water. Monomers were added to separated amber flasks in order of most viscous to least viscous and stirred overnight. CQ was added followed by photo inhibitor, BHT, 4-methoxyphenol and stored into separated black plastic bottles at 4 °C. Such formulation was used to prepare the acrylamide-based universal containing no 2-AI/H10 (control group) and the experimental groups contain 2-AI-H10 at 2%wt and 6%wt. DOC: The degree of conversion (DOC) was performed on unpolymerized (UN) and polymerized (P) materials using an ATR-FTIR instrument. For UN, 10μL were placed on a diamond ATR-crystal and absorbance spectra collected at 16 scans/1 cm-1 resolution. For P, the same amount was placed on a glass slide, light cured (14 J/cm2) and spectra proceeded as with UN. The peak areas of methacrylamide and methacrylate C=C stretching at 1637 cm-1 and aromatic reference peak area of Bis-GMA at 1608 cm-1 of uncured and cured adhesives were used to calculate the DC% (n=5) using the adjacent formula. Biofilm inhibtion: S. mutans cell biofilm test was used to evaluate bacteria inhibition. Resin disks (N=3) of each material were prepared (1 mm heigh and 9 mm diameter), polymerized, and sterilized under UV light (8h) under a hood. Next, 1x10^5 bacterial S. mutans U159 were used with Tryptic Soy Broth for 24 h to grow early biofilm for 24h and 5 days. The disks were gently washed with PBS and a Live/Dead backlight kit was used to assess the biofilm viability using a Fluorescence microscope (Keyence Z1000, 20x). Live/Dead cell were counted using image cytometer and hybrid cell count. The outcomes of the research have provided insight into the application of 2-Al/H10 in Acrylamide UA. In both 24 hours and 7 days, the antimicrobial inhibition of H10 has shown resilience in depleting functionality of bacteria as the concentration increases. The results for DC should be interpreted with caution to limitations of the current research. The timeline did not allow for repetition of the test.

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Candida albicans cell wall modulates Host response of HIV infection of monocyte like cells

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Differences in cell wall composition (O- or N-linked mannans) will drive different responses in the host pro- and anti-viral restriction factors. We were able to study a cell wall mutated C. albicans. The objective of this study was to determine the effect of C. albicans and N-mannan and/or O- mannan on response against HIV -1 BaL virus. 7 mutated c. albicans and a non-mutated (CA 152) with different cell composition were analyzed against the infection of HIV-1 Bal virus in monocyte like cells THP-1. Cell viability (resazurin method) and infection (ELISA p24) were used to determine the positive, negative, or null effect of the interactions within groups. RT2 qPCR was used to determine the fold change of specific restriction factors associated with HIV infection. All groups expressed a cell viability after 7 days of infection with the virus. The CA 358 expressed a positive effect against the HIV infection of THP1 cells (p=0.009), when analyzed the ELISA p24. The PCR showed upregulation of ABOPEC, BST2, SAMDH, and IFN (gamma) after the first 3h of infection. We can infer that there is an interaction of the cell composition among different mutants of the same species on the host response when an infection with HIV-1 Bal happens.

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Protein biomarkers for mitochondrial dynamics in the forebrain of aging rats

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Mitochondrial dysfunction is an early hallmark of neurodegenerative disorders. The goal of this study was to analyze the expression in the healthy aging brain of mitochondrial markers affected in Alzheimer's disease (AD). The specific mitochondrial markers studied in this project are indicators of mitochondrial calcium uptake (MICU1) and mitochondrial biogenesis (Sirt3). We asked if these proteins' alterations occur in the normally aging brain or are specific to AD. Animals: Two age groups of Fischer female rats (F344) were studied (3- and 10-12 months

old). Isolation of Mitochondria: Pierce Mitochondria Isolation kit for tissue was used to extract mitochondria from forebrain samples. Immunoblotting: Whole cell lysates and mitochondrial fractions were analyzed by standard SDS-PAGE, followed by western blotting. Densitometry analysis: Protein bands were quantified using FIJI/Image J.

MICU1 (Mitochondrial Calcium Uptake 1) opens the Mitochondrial Calcium Uniporter (MCU) leading to mitochondrial Ca2+ overload, ROS production, and cellular stress. Inhibiting the MCU has been proposed as a therapeutic target against AD. We show an age-dependent upregulation of MICU1 in whole cell lysates (FIG1A and C), with no significant difference between mitochondrial fractions (FIG2A and C). The processed short form of SIRT3 is mostly localized to mitochondria, where controls metabolic functions, while the full length SIRT3 localizes to the nucleus to modulate stress-related and nuclear-encoded mitochondrial genes. Mitochondrial SIRT3 is reduced in the AD brain. Here we show that in the middle-aged brain, SIRT3 expression increases in the whole lysates, while mitochondrial SIRT3 decreases.

We conclude that the total level of MICU1 and SIRT3 increases with aging in the brain as a potential compensatory mechanism. Uncoupled changes in the mitochondrial MICU1 and Sirt3, might be due to altered protein translocation between the cytoplasm and mitochondria with progression of aging.

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Mineralizing a Dentin-like Structure for Clinical & Educational Applications with Calcium Phosphate and gelMA.

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GelMA has superior cell adhesion and higher porosity compared to stiffer counterparts. This facilitates improved distribution of calcium and phosphate ions within the hydrogel, promoting enhanced mineralization throughout the 3D network. However, gelMA alone does not mineralize in the absence of cells. To address this limitation, we propose augmenting gelMA composition with collagen Type I and evaluating its hardness and modulus of elasticity when combined with a calcium phosphate solution. We hypothesize that mixing gelMA, collagen, and calcium phosphate solution at specific concentrations will yield a dentin-like tissue. Our aim is to assess the hardness and modulus of a construct composed of gelMA/collagen to calcium phosphate solution at a 3:1 ratio. A gelMA and collagen solution, containing 1.5mg/mL collagen, was prepared. This was mixed with a phosphate hydrogel solution at a 3:1 ratio. Gelation was induced by incubating the solution at 60°C for 2 hours. A 3.34M calcium nitrate tetrahydrate solution was then added in equal volume and left for 72 hours for mineralization. The resulting product was a gelMA/collagen infused HAp–PAA composite. After running eight tests on the samples, the hardness was an average 0.204 gPa plus a standard deviation of 0.089. The average modulus was 18.98gPa with a standard deviation of 12.03. The reported values on the literature for dentin hardness and modulus are 1.0gPa and 19gPa, respectively.

Out of eight tests conducted, three reported hardness and modulus values of 0, which were excluded from the data. These zero values might indicate nonuniform mineralization homogeneity in the material. Additional experiments are underway to investigate mineralization uniformity. GelMA mixed with type I collagen and a calcium phosphate HAp–PAA solution forms a structure with hardness akin to natural dentin.

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Assessment of the Antifungal Activity of Geraniol, Citronellal, and Linalool

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Histidine5 (His5) may exert antifungal activity by disrupting Candida cell membranes, penetrating cells, inhibiting essential enzymes, and displaying antibiofilm effects, leading to growth inhibition and cell death. The objective of this work was to evaluate the in vitro antifungal and cell viability activity of peptide His5 on Candida species and Human gingival fibroblasts. Initially, Minimal Inhibitory (MIC) and Fungicidal (MFC) Concentrations were determined for *albicans* (ATCC 321182) 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, His5 was used at MIC - 1 mM. Time-kill assessed after 24h. And finally, Human Gingival Fibroblasts were exposed to His5 at 1mM for cell viability assessment with resazurin digestion after 3h. His5 presented antifungal activity against *albicans 38.7%* and non-*albicans Candidam glablatra 61.4%.* For the other two strains, dose response was not present an inhibitory effect. Cells HGF tested after 3h present a IC50=12.52 ug/mL and 6h IC50=33.63ug/mL. His5 shows an antifungal activity, affecting *Candida albicans and glabratra*, cell viability showed a compatible behavior with a biomaterial.