UCSF SCHOOL OF DENTISTRY PRESENTS

Research and Clinical Excellence Day

Thursday, March 3, 2022

KEYNOTE SPEAKER

Kimon Divaris, DDS, PhD
Professor
University of North Carolina
Adams School of Dentistry
Pediatric and Public Health

FACULTY RESEARCH LECTURER

Caroline Shiboski, DDS, MPH, PhD
Professor and Chair, Department of Orofacial Sciences
Leland A. and Gladys K. Barber Distinguished Professor in Dentistry

SPOTLIGHT ON CLINICAL EXCELLENCE

Guo-Hao (Alex) Lin, DDS, MS
Health Sciences Assistant Clinical Professor
Director, Postgraduate Periodontics Program
Diplomate, American Board of Periodontology

For more information, contact
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UCSF School of Dentistry

AGENDA

UCSF School of Dentistry Research and Clinical Excellence Day
March 3, 2022

9:00 – 9:10 **Welcome and Opening Remarks**
Sarah Knox, PhD
Assistant Dean for Basic Science Research
Co-Chair, RCED Committee

Michael Reddy, DMD, DMSc
Dean and Professor
UCSF School of Dentistry

9:10 – 10:00 **Plenary Speaker**
Kimon Divaris, DDS, PhD
Professor
University of North Carolina
Adams School of Dentistry
"The foundations of precision oral health"

10:00 – 10:15 Break

10:15 – 11:30 **Oral Presentations**
Kristin Hoeft, PhD
Session Chair

Liza Harutyunyan
(Mentors: Drs. Cristin Kearns & Stuart Gansky)
"Sugar industry surveillance of dentists: reanalyzing a 1946 opinion poll"

Yunqing Yu
(Mentor: Dr. Licia Selleri)
"Uncovering the roles of Lemd2 in craniofacial development"

Stanley Onuegbu
(Mentor: Dr. Elizabeth Mertz)
"Assessing black dentists' contributions to adult's oral health in Medi-Cal dental"

Erin Welter
(Mentor: Dr. Diana Nguyen)
Clinical Case: "Treatment options for severely mobile teeth"

Samantha Garcia
(Mentor: Dr. Howard Pollick)
"Water operators' opinions on continuing education on fluoridation"

Donna Baldetti
(Mentor: Dr. Sharof Tugizov)
"Human cytomegalovirus (HCMV) infection in polarized and non-polarized lung epithelial cells"

Esther Gao
(Mentor: Dr. Benjamin Chaffee)
"Perceived neighborhood cohesion associated with oral health and dental utilization"

Parag Srivastava, BDS
Literature Review: "Implants vs Endo: as the pendulum swings"

11:30 – 12:00 ***Spotlight on Clinical Excellence***

Guo-Hao "Alex" Lin, DDS, MS
Health Sciences Assistant Clinical Professor
"Extraction vs. regeneration: A clinical dilemma"

12:00 – 1:30 Lunch in Saunders Court (D1)
Poster session in the Millberry Union Gym (D2)
45 mins each then swap

1:30 – 2:45 **Oral Presentations**
Matthew Kutys, PhD
Session Chair

Zachary Dai
(Mentor: Dr. Rishi Jay Gupta)
"Condylar positioning In maxillomandibular surgery using custom guides and plates"

Jai Eun Huh
(Mentor: Dr. Jeffrey Bush)
"Investigating the role of Shrm4 and Efnb1 signaling in the secondary palate development"

Gabriel Chong, DDS
"Do cariology and periodontology receive equal emphasis in dental education? A comparison of two investigations conducted 13 years apart."

Samantha Rustia
(Mentors: Drs. Sneha Oberoi & Rumpa Ganguly)
"Treatment outcomes of presurgical orthodontic alignment in alveolar cleft reconstruction"

Keshav Kumar
(Mentor: Dr. Diana Nguyen)
Clinical Case: "Case exploration of clinical and restorative considerations for patient's existing temporary holding care"

Natalie Khalili
(Mentor: Dr. Kristin Hoeft)
"Oral health engagement among adolescents with varying caries risk trajectories"

Moyu Fu
(Mentors: Drs. Alfa Yansane & Joel White)
"Evaluating the use of teledentistry in response to COVID-19 pandemic"

Carolyn Nguyen
(Mentors: Dr. Christine Hong)
" P75NTR-Deficient mice demonstrate defective temporomandibular joints"

2:45 – 3:35 **Faculty Research Lecturer**
Caroline Shiboski, DDS, MPH, PhD
Chair and Professor
Title: "From HIV-related oral disease to Sjögren's next generation studies: A 30-year journey"

3:35 – 3:45 **Mentor of the Year Award**
Presented by the John C. Greene Society
Meredith Zhou, President

3:45 – 4:00 **Announcement of Awards**
Stuart Gansky, MS, DrPH
Associate Dean for Research

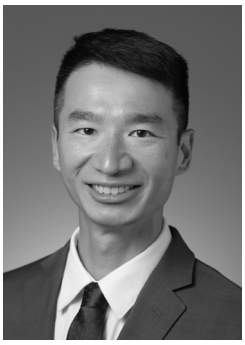
Closing Remarks
Sarah Knox, PhD
Assistant Dean for Basic Science Research

SPEAKER BIOS

Kimon Divaris, DDS, PhD | Plenary Speaker | Dr. Kimon Divaris is Professor of Pediatric Dentistry in the Division of Pediatric and Public Health and the Department of Epidemiology at the University of North Carolina at Chapel Hill. A board-certified pediatric dentist, he is actively involved in teaching at all levels, clinical practice, and research. He is an oral and genetic epidemiologist, and his NIH-funded research program lies in the intersection of clinical, biological, and public health research for precision pediatric oral health applications. He is the recipient of several major awards and has had substantial scholarly and editorial activity.

Presentation: "The foundations of precision oral health"

Abstract: Precision medicine relies on the aspirational goal of tailoring prevention, disease management and treatment according to people's innate characteristics and contextual factors. This is relevant to oral health—to optimize all people's oral health and dental care there is need to integrate clinical, behavioral, and social information with biological data. The emergence of precision oral health is slow but arguably inevitable. The presentation will cover fundamental concepts and recent research findings in precision medicine and dentistry and will discuss the promise, limitations, and opportunities for precision health applications in clinical and public health settings.



Guo Hao (Alex) Lin, DDS, MS | Spotlight on Clinical Excellence | Dr. Alex Lin, DDS, MS, is an assistant clinical professor and the program director of Postgraduate Periodontics. He received his DDS degree from National Yang Ming University, Taipei, Taiwan, and his MS & Certificate in Periodontology from the University of Michigan, Ann Arbor. He is a board-certified periodontist and has published several research articles in peer-reviewed journals. His research focuses on evidence-based dentistry, periodontal regeneration, and implant-related clinical trials. Outside dentistry, Dr. Lin enjoys hiking, backpacking, bouldering, and trying new restaurants.

Presentation: "Extraction vs. regeneration: a clinical dilemma"

Caroline Shiboski, DDS, MPH, PHD | Faculty Research Lecturer Award| Dr. Shiboski is Professor of Oral Medicine, and Chair of the Department of Orofacial Sciences, School of Dentistry. She has advanced training in Oral Medicine (is a Diplomate of the American Board of Oral Medicine) and Epidemiology (MPH and PhD from UC Berkeley). Her research experience focuses on the epidemiology of oral manifestations related of immune dysfunction, Oral Cancer, and Sjögren's syndrome. Dr. Shiboski has received NIH funding for her research consistently since 1994.

Presentation: **"From HIV-related oral disease to Sjögren next generation studies: a 30-year journey"**

Abstract: As an Oral Medicine specialist and Epidemiologist Caroline Shiboski's research experience focuses on the oral complications of various forms of immune dysfunction. As Chair of the Oral HIV/AIDS Research Alliance Collaborative Science Group (that was part of the AIDS Clinical Trial Group Network), she led the development and implementation of number of study protocols pertaining to the oral complications of HIV and antiretroviral therapy, in the US and internationally. This work was subsequently extended to the Pediatric HIV/AIDS Cohort Studies (PHACS).

Over the past 19 years, Shiboski has been the lead Epidemiologist of the Sjögren's International Collaborative Clinical Alliance (SICCA), initially founded by Troy Daniels and John Greenspan, then its PI with co-PI Lindsey Criswell. More than 3500 participants with signs/symptoms suggestive of Sjögren disease (SjD) were recruited in 6 international and 3 US sites as part of SICCA, yielding the largest SjD biorepository and data registry in the world. This unique resource is available to investigators worldwide to conduct SjD pathogenesis, epidemiologic, and genetic studies. Shiboski and Statistician Stephen Shiboski, played a critical role in the design of the SICCA registry, development of data collection tools, and classification criteria for SjD, which were provisionally approved by the American College of Rheumatology (ACR). Subsequently, they spearheaded an international effort that resulted in a definitive criteria set for SjD, approved by ACR and the European Alliance of Associations for Rheumatology. Currently, Shiboski is the PI of SICCA-NextGen (NIDCR-funded U01), to generate omics and epigenetic data from existing SICCA specimens, that will enable high impact studies of underlying SjD biologic pathways, while enhancing the SICCA registry. This project is an example of campus-wide collaboration as the first NIH-funded project to partner with UCSF CoLabs, an exciting new initiative that brought Parnassus Flow Cytometry, Biological Development Imaging, Functional Genomics, Disease to Biology, and Data Science under one umbrella.

Shiboski's 30-year journey at UCSF, from her initial research endeavors on HIV-related Oral Disease to Sjögren Next Generation Studies, highlights the importance of team science and interprofessional partnerships.

ABSTRACTS

I. PREDOCTORAL CATEGORY

1) Title: Human cytomegalovirus (HCMV) infection in polarized and non-polarized lung epithelial cells

D. BALDETTI (1), X. CAI (2), S. TUGIZOV (2)

1) UCSF School of Dentistry, 2) UCSF Department of Medicine, Infectious Diseases

Objectives: Human cytomegalovirus (HCMV) causes pneumonia in HIV-1 infected children; however, the mechanism of HCMV infection in lung epithelial cells remains poorly understood. Lung epithelial cells have a polarized organization, and HIV-associated upregulation of proinflammatory cytokines may induce depolarization of lung epithelial cells, thus playing a role in HCMV infection and spread. Therefore, the goal of this study was to investigate HCMV infection in polarized and non-polarized lung epithelial cells.
Methods: To establish polarized lung epithelial cells, primary bronchial epithelial cells were cultured in Transwell inserts. To confirm cell polarity, the transepithelial resistance (TER) of epithelial cells was measured. Expression of tight junction proteins zonula occludens-1 (ZO-1) was examined by immunofluorescence assay. HCMV VR-1814 was used for infection of lung epithelial cells, and infection was examined by expression of the viral immediate early (IE) proteins.
Results: We established highly polarized bronchial epithelial cells with TER values ranging between 867.8 Ω x cm² and 742.9 Ω x cm². These cells expressed ZO-1 in a ring-shaped pattern, indicating well-developed cell polarity. In parallel experiments established non-polarized bronchial epithelial cells characterized by a low-density of epithelial cells which did not develop TER values and did not express ZO-1 in the lateral membranes. Infection of polarized and non-polarized cells with HCMV VR-1814 showed that polarized cells were not infectable with the virus from both the apical and basolateral membranes. In contrast, non-polarized cells were highly infectable with HCMV, expressing viral IE proteins in 40-50% of cells.
Conclusions: Our results suggest that the polarity of lung epithelium may regulate HCMV infection. Highly polarized cells display resistance against HCMV. In contrast, non-polarized bronchial epithelial cells significantly promote HCMV infection. HIV-associated upregulation of cytokines induced depolarization of lung epithelial cells in vivo may increase HCMV infection of lung epithelium leading to HCMV-mediated pneumonia.
Support: UCSF School of Dentistry, Department of Cell & Tissue Biology, NIDCR R01DE028129 grant

2) Title: A novel biomimetic culture system to study the impact of solid stress on head and neck carcinoma

K. CHO (1), G. FORD (2,3,4), M. KUTYS (4)

1) UCSF School of Dentistry, 2) UCSF School of Medicine, Department of Surgery, 3) Center for Bioengineering and Tissue Regeneration, 4) UCSF School of Dentistry, Department of Cell and Tissue Biology

Objectives: The objective of the project is to further investigate the relationship between mechanical stresses in HNSCC aggression and intercellular signaling by designing and fabricating a novel culture system to which calculated stresses can be applied to represent physiological extracellular matrix.
Methods: To address the shortcomings of traditional models, we developed a 3D biomimetic system to apply calibrated compressive and tensile forces on patient derived tumor spheres. Finite element analysis (FEA) of our model predicted strain fields associated with tumor aggression and quantitative particle image velocimetry (PIV) measured strain values using fluorescent beads upon compressive actuation. The two strain values are compared for confirmation to determine accuracy between our FEA model and physical model. Furthermore, using microfluidic fabrication techniques allowed production of cost efficient and functioning biocompatible culture systems.
Results: We were able to successfully create a novel functioning stress inducing culture system to study cancer cell proliferation. Our system contributes morphological and cellular behaviors in tumor spheres directly to physical forces.
Conclusions: Our novel 3D biomimetic system allows us to investigate and better understand how compressive and tensile forces contribute to tumor aggression linking molecular signals to the mechanical force responsible for pathogenesis. Ultimately, we aim to unveil the role of compressive and tensile solid stress on tumor aggression and link signaling pathways to impact on pathogenesis.
Support: Professors Emeriti Drs. John and Deborah Greenspan

3) Title: S. sanguinis ATCC 10556 and SK36 anticancer effects trigger an upregulation in cytokine- and inflammatory-related oral squamous cell carcinoma gene expression

W.H. CHO, A. RADAIC, S. GANTHER, P. KAMARAJAN, Y. KAPILA

UCSF School of Dentistry, Department of Orofacial Sciences

Objectives: Despite recent advancements, survival rates for oral cancer haven't improved significantly in decades, highlighting the need for alternative therapies. One therapy may involve resolving dysbiosis and/or restoring eubiosis in the oral microbiome. Although dysbiosis has been implicated in the pathogenesis of oral cancer, its mechanistic contributions have not been well explored. Studies highlight the importance of oral commensals, specifically streptococci as a signature of health. For example, specific oral microbial shifts are associated with transitions from health to cancer in oral squamous cell carcinoma (OSCC) specimens; health is defined by a high Streptococcus to low Fusobacterium ratio, whereas cancer has the opposite profile. Our data shows that 3 S. sanguinis strains significantly suppress OSCC proliferation and migration compared to controls. Our RNA-seq data reveal that S. sanguinis triggers a molecular host response in OSCC cells, primarily by immune/cytokine and adhesion/ECM pathways. The objective is to determine the mechanisms by which S. sanguinis strains mediate anticancer effects, by validating the highly differentially altered genes from our RNA-Seq data.
Methods: Oral cancer (HSC-3) cell lines were challenged with S. sanguinis ATCC 10556 and SK36 at a MOI of 50 for 2h (n=9). After 24h, RNA was extracted and the gene expression of 12 cytokine- and inflammatory-related genes was accessed by RT-qPCR. Expression levels were normalized by GAPDH levels and shown relative to HSC-3 control cells.
Results: S. Sanguinis ATCC 10556 and SK36 significantly upregulates 7/12 and 8/12 genes tested, respectively.
Conclusions: This work allows us to focus on genes involved in the anticancer effects mediated by S. sanguinis. Next steps include testing specific pathways via suppression/overexpression assays of top upregulated genes and examining changes in cell proliferation, migration, and invasion. Confirming a mechanism of the anticancer effects of S. sanguinis may serve as the basis for a novel cancer therapeutic.
Support: UCSF School of Dentistry, Department of Orofacial Sciences, AAP Sunstar Innovation Grant, NIH R01DE025225 grant to YLK

4) Title: Assessment of schoolteachers' knowledge and skills about traumatic dental injury management in the Santa Clara school district

A. DABAK (1), K. SOKAL-GUTIERREZ (2)

1) UCSF School of Dentistry, 2) University of California Berkeley, School of Public Health

Objectives: The purpose of this study was to assess the knowledge and skills of school teachers about traumatic dental injuries and their management in the Santa Clara school district.
Methods: A two part online survey on the demographic and scenario-based questionnaire was sent to school teachers in Santa Clara, CA. A total of 62 teachers responded.
Results: About 47 (82.5%) respondents (n=57) did not receive formal training on Traumatic Dental Injuries (TDI). The three scenario-based questions included dental crown fracture, lateral luxation, and dental avulsion (knocked-out tooth). The teachers exhibited moderate knowledge in the first two scenarios, 66.7% of teachers knew the fractured crown segments can be reattached and 73.6% of teachers knew the fragments needed to be carried in a moist medium. Limited knowledge was shown in the third scenario of dental avulsion.
Conclusion: The level of knowledge and skills about TDI management in teachers from Santa Clara schools is limited. Reliable information and adequate training campaigns will help teachers acquire the required skills and knowledge to manage TDI.

5) Title: Condylar positioning in maxillomandibular surgery using custom guides and plates

Z. DAI, R.J. GUPTA

UCSF School of Dentistry, Department of Oral and Maxillofacial Surgery, San Francisco VA HCS

Objectives: One of the challenges for obstructive sleep apnea (OSA) patients who are candidates for maxillomandibular advancement (MMA) surgery is ensuring the condyle of the temporomandibular joint (TMJ) maintains the same position before and after surgery. The investigators hypothesize the condylar position will be preserved by using custom printed mandibular cutting guides and plates.
Methods: A retrospective and prospective case series was performed by obtaining pre- and post- operative CT scans of OSA patients who underwent MMA surgery with custom printed mandibular cutting guides and plates (n=5). A series of measurements were taken bilaterally in sagittal CT sections measuring the displacement within the posterior space (PS), superior space (SS), and anterior space (AS) of the condylar fossae. The post-operative CT scans were superimposed on to the planned surgical anatomy for qualitative analysis.
Results: The average variance in the PS, SS, and AS were 0.28 ± 0.25, 0.62 ± 0.80, and 0.40 ± 0.19, respectively, in the left condylar fossa. In the right condylar fossa, the PS, SS, and AS were 0.50 ± 0.34, 0.78 ± 0.26, and 0.05 ± 0.57, respectively. Superimposition of the post-operative CT images confirmed minimal displacement from the pre-surgical planned anatomy.
Conclusion: The use of custom printed mandibular cutting guides and plates shows little to no displacement of the left and right condyles within this subset of patients. The advantage over the traditional approach to MMA surgery without the use of custom printed mandibular cutting guides and plates is the minimal displacement of the TMJ condyle, limiting the variability of condylar positioning between patients, and having predictable results that are accurate relative to the planned anatomy. Furthermore, maintaining the position of the TMJ condyle may prevent issues such as TMJ disorder, malocclusion, and functional problems.
Support: UCSF School of Dentistry, Department of Oral and Maxillofacial Surgery, SFVA / KLS Martin, Jacksonville, Florida.

6) Title: To better understand the heterogeneity of the epithelium, particularly the subpopulation of genes (Cluster 6 Epithelial λ Effectors) found linked to the fusion site of midface morphogenesis

T. DO, L. SELLERI, M. LIABATA, B. CHACON

UCSF School of Dentistry, Department of Orofacial Sciences

Background: Midfacial Morphogenesis requires coordinated outgrowth & fusion of multiple prominences. Failure of fusion at these prominences (λ junction) notably results in Cleft Lip/Palate (Cl/P). Prior investigations by the Selleri Lab shows that specific genetic disturbances in epithelium have different phenotypic outcomes than mesenchyme. In addition, coinciding with the lab's findings that interpret genes involved in human CL/P are differentially expressed and enriched in the λ epithelium (ScRNAseq data from Marta Losa Llabata, Selleri Lab), surface cephalic epithelium became a site of interest for understanding midface morphogenesis.
Objective: To better understand the heterogeneity of the epithelium, particularly the subpopulation of genes (Cluster 6 Epithelial λ Effectors) that was found to be linked to the fusion site of midface morphogenesis
Methodology: ScRNAseq revealed top differentially expressed genes (Cluster 6 Epithelial λ Effectors) at the fusion site. Of the enriched genes, Novel Genes (zfhx3, Eef1a1, Dsp, Arid5b, chd3, Pik3r1, tulp4) of interest were chosen for further investigation. Riboprobe synthesis of selected genes was performed for Whole-Mount In-situ in Mouse Embryos at stage E10, E10.5, E10.75 and E11-11.5. Expression at the fusion site were visualized post-embedding and sectioning.
Results: Of the seven genes of interest, four (eef1a1, pik3r1, chd3 and arid5b) were successful in riboprobe synthesis. WISH validated expression of working genes and the localization of expression at the midface fusion site (epithelial vs. mesenchymal)
Conclusions: This study qualitatively shows the expression of selected genes. Further investigation is necessary to better understand the role and pathway of relevant genes.
Support: The Licia Selleri Lab

7) Title: Expression of Pb1A and Pb1B mRNA in oral streptococcus mitis

S. DUTTA, R. SHEMIRANI, Y. NAKANO

UCSF School of Dentistry, Department of Orofacial Sciences

Objectives: Streptococcus mitis (S. mitis) is an oral commensal bacteria that can enter to bloodstream from oral mucositis and cause life-threatening bloodstream infections (BSI) in patients who receive hematopoietic stem cell transplants (HSCT). It is known that a platelet S. mitis strain SF100 uses surface proteins Pb1A and Pb1B (platelet binding protein 1A and 1B) to mediate direct interaction with human platelets. In this strain, Pb1A and Pb1B proteins significantly increase after exposure to UV and mitomycin C (a chemotherapy drug), both of which damage DNA similar to the conditioning regimens before HSCT. If the conditioning treatment also increases Pb1A and Pb1B proteins in S. mitis of the oral cavity, it would explain BSI's higher occurrence in HSCT patients. We, therefore, aimed to examine the expression of Pb1a and Pb1b mRNA in oral S. mitis**.**
Methods: Pb1a and Pb1b mRNA expression and its change in responding UV or mitomycin C in a lab-cultured oral S. mitis strain (ATCC 49456) and S. mitis isolated from salivae of multiple healthy human sources were examined by qPCR.
Results: Both lab-cultured oral S. mitis strain and S. mitis isolated from multiple human salivae expressed Pb1a and Pb1b mRNA. And UV and mitomycin C treatment significantly increased the Pb1a and Pb1b mRNA levels.
Conclusion: We confirmed that oral S. mitis expresses Pb1a and Pb1b mRNA, which react to UV and mitomycin C. Variable response range of Pb1a and Pb1b mRNA expression to UV and mitomycin C in S. mitis isolated from multiple human sources may be associated with BSI susceptibility in HSCT patients.
Support: UCSF School of Dentistry, Dental Trade Alliance

8) Title: Assessing the usefulness of PRDS demonstration video series on simulation lab learning for dental students

R. FORNI, M. GAD, J. WHITE

UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences

Background: With ever-increasing access to and advancements in technology, it follows that video demonstrations have become the most common way to deliver instructions when learning new motor tasks. In the field of education, particularly in today's COVID-19 world, the implementation and utilization of technology to deliver learning content is both increasingly practical and necessary as education has entered a hybrid - and at times a fully virtual - learning model.
Objective: The current learning resources for the sim lab portion of PRDS are largely powerpoints containing 2D images of the final products that students are trying to produce. This makes the leap between the stages of Kolb's Experiential Learning Spiral quite large, as our resources lack the visual demonstration of how to attain the final products featured in **images. This PRDS** Demonstration Video Series aims to supplement current resources with videos showing the how behind the procedures, enabling students to boldly engage with deeper layers of learning and practice with confidence.
Methods: We created a series of short high-quality, demonstrative informational videos for the Operative and Crown & Bridge sections of PRDS 116, PRDS 117, PRDS 118. Videos illustrate the full procedure, while simultaneously highlighting ideal examples, key measurements in the preparation, armamentarium used at different stages, and best practices. To evaluate the value of these videos as an augment to traditional learning, we employed CLE Mediasite standard data metrics to analyze the degree of engagement among dental students.

Results: The preliminary data that has been analyzed thus far suggests that these demonstration videos have been utilized in full by more than half of the current D1 class. Conclusion: If this venture proves successful based on the data collected from this study, such videos and learning methods could be more permanently and broadly integrated into the dental school curriculum.
Support: UCSF School of Dentistry, Department of Preventative and Restorative Dental Sciences

9) Title: Evaluating the use of teledentistry in response to COVID-19 pandemic

L. FU (1), A. YANSANE (1), J. WHITE (10, B. RINDAL (2), E. KALENDERIAN (1)

1) UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences, 2) Health Partners

Objectives: Understand the distribution and characteristics of Teledentistry users at HealthPartners for a 9-month period during COVID-19 pandemic.
Methods: HealthPartners, an integrated dental-medical health care organization, implemented their Teledentistry program in April 2020. Patients of record who contacted the clinic were offered to schedule a 20-minute virtual visit (VDV, phone or video) with a dentist and a follow-up visit within a month per outcome of the initial visit. The analysis was drawn utilizing electronic health records of 3,658 patients at HealthPartners in Minnesota, USA, from April – December 2020. The main electric health record (EHR) measures were identified to evaluate the use of VDVs during pandemic, including patient characteristics, time to VDVs, visit time and immediate visit resolution.
Results: Patient characteristics of the virtual dental visit users are identified (Table 1). Post the initial VDVs, the average waiting time for a follow-up visit is 9.8 days (Table 2). The top three reasons for a VDV were fractured tooth, fractured dental restoration, and toothache. The top procedures provided by dental specialists were identified (Table 3). The most common procedures during the follow-up visit were examination, restoration, and extraction. As for the immediate visit resolution, 59.1% of the patients had a follow-up visit within 1 month after the initial VDVs. Out of those patients who came for the follow-up visit, 95.8% of those visits were in-person, 3.3% were phone visits, and 0.1% were video visits. 13.6% of the patients got referred to a specialist. 40.9% of the patients were considered to have their problem resolved after the initial VDVs.
Conclusion: The results indicated the use of Teledentistry can be beneficial in triaging and resolving certain dental problems. 40.9% of patient problems can be revolved virtually after the initial visit. Additional EHR metrics should be further explored to evaluate the effectiveness of Teledentistry.
Support: The Lee Hysan Oral Epidemiology Chair Fund

10) Title: Perceived neighborhood cohesion associated with oral Health and Dental Utilization

E.GAO, B. CHAFFEE

UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences

Objectives: Improving oral health outcomes remains a priority in California. Greater social cohesion, an individual's sense of solidarity within a community, has been associated with better oral health outcomes for older adults. This study focuses on understanding the associations of neighborhood social cohesion with self-rated oral health and dental service utilization within the general population.

Methods: For this cross-sectional analysis, responses from 42,330 adult (age≥18) participants in the statewide representative California Health Interview Survey (2017-2018) were used to measure perceived neighborhood social cohesion, self-rated oral health ("fair" or "poor" vs. "excellent," "very good," or "good"), and time since last dental visit (>12-months/never visited vs. 12-months ago or less). Neighborhood social cohesion was measured using 3 Likert-type questions, and a 10-point numeric score was created based on responses. Survey-weighted multivariable logistic regressions were conducted for each outcome (fair/poor self-rated oral health and dental visit >12-months ago), adjusting for plausible confounders (e.g., age, income, urbanicity). Relationships between neighborhood social cohesion and the two oral health outcomes were expressed as odds ratios. A subgroup analysis assessed statistical interaction to explore whether social cohesion and oral health associations differed by participant demographic and socioeconomic characteristics.
Results: Each one-point increase in self-reported neighborhood social cohesion score was associated with lower adjusted odds of fair/poor self-rated oral health (OR: 0.88; 95% CI: 0.85-0.91). Likewise, increasing neighborhood social cohesion score was associated with lower adjusted odds of >12-months since last dental visit (OR: 0.95; 95% CI: 0.92-1.00). No statistically significant interactions with participant characteristics were seen for either health outcome.
Conclusions: Individuals reporting higher levels of neighborhood social cohesion also report better oral health status and dental visit behaviors. Efforts to strengthen neighborhood social cohesion could provide a protective effect on the oral health of the general population.
Support: The John C. Greene Preventive Dentistry Chair Fund

11) Oral Presentation Title: Water operators' opinions on continuing education on fluoridation

S. GARCIA (1), H. POLLICK (1), M. STOCKS (2)

1) UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences, Division of Oral Epidemiology & Dental Public Health, 2) California Oral Health Technical Assistance Center

Objectives: Community water fluoridation is a proven public health measure to reduce the incidence of dental caries. Water operators and associated personnel are responsible for maintaining the fluoridation levels of water treatment facilities. Each water operator must meet a standard number of continuing education requirements to renew certification once every 3 years. However, continuing education on the importance of fluoridation in relation to oral health is limited. The Centers for Disease Control and Prevention (CDC) offers a free, online training course to educate water operators on the implementation and incidence of community water fluoridation called FLO (Fluoridation Learning Online). Although this course is available for continuing education credit, the extent to which water operators value this course as an important part of continuing education remains unknown. This project aims to assess current attitudes on water fluoridation among water operators and to gauge their interest in expanding continuing education on fluoridation through programs like FLO.
Methods: Based on a literature search and previous surveys, and consultation with experts in water fluoridation, a Qualtrics survey was designed to assess the following: the fluoridation status of the water treatment facility, attitudes toward fluoridation, and knowledge of continuing education opportunities in fluoridation, specifically FLO. The survey will be distributed to water operators and other associated personnel who are members of the CA-NV AWWA. The data will be tabulated and analyzed by key variables, such as current fluoridation status, using a 2x2 chi-squared analysis.
Results: It is anticipated that the survey will be distributed and results will be forthcoming by March 2022.

12) Title: Sugar industry surveillance of dentists: reanalyzing a 1946 opinion poll

L. HARUTYUNYAN, S.A. GANSKY, C.E. KEARNS

UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences, Center to Address Disparities in Children's Oral Health (CAN DO), and Philip R. Lee Institute for Health Policy Studies

Objectives: The US sugar industry founded the Sugar Research Foundation (SRF) in 1943 to cast doubt on sugar's role in obesity, diabetes, and dental caries. In 1946, SRF commissioned an opinion poll to assess dentists' attitudes toward sugar. This study's objective was to analyze the survey data and contextualize the results.
Methods: Raw data were obtained from the Roper Center for Public Opinion Research, imported in STATA and cleaned. Frequency counts and percentages were cross-tabulated. Twenty-one internal SRF documents related to the survey were identified in the UCSF Food Industry Documents Archive. Documents were read chronologically, and a narrative of events was constructed.
Results: SRF's poll asked 13 questions related to American diet healthfulness, dental caries control measures, dental caries causes, opportunities to advise patients on sugar intake, recommended candy intake frequency, cariogenicity of sugars, and dental information channels respondents utilized. The February 1946 survey used a controlled-quota sampling strategy in 9 US regions, and received 419 respondents. Most respondents were male (98%), between the ages of 40-59 (60%), and believed: Americans ate too many carbohydrates (70%), dental caries could be controlled (94%), sugar caused dental caries more than any other foods (68%), and could readily advise patients to eat less sugar (49%). The most common ways respondents received dental information were attending dental society courses (54%), through national, state, and local dental meetings (44%), and from the Journal of the American Dental Association (30%).
Conclusion: SRF's 1946 poll confirmed dentists held strong anti-sugar beliefs and aided in identifying communication channels that its forthcoming public relations campaign could target to change dentists' attitudes about the importance of reducing sugar consumption to control dental caries. The oral health community should be aware of the sugar industry's longstanding surveillance strategies designed to change dentists' attitudes and behavior related to dietary recommendations.
Support: UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences, NIH/NIDCR K08DE028947

13) Title: Determinants of oral health practice in children with special needs

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Objectives: Children with special health care needs are a heterogenous population that faces many barriers to maintaining oral health. This project sought to identify trends in diet and oral hygiene practices, dental support needs, and impacts of the COVID-19 pandemic on oral health in this population.
Methods: A Qualtrics survey was sent to caregivers of children receiving special education services in California. The survey was distributed through by the Yuba County Office of Education, KEEN (a nonprofit), and Family Empowerment Centers. Survey questions asked about the child's demographic information, oral health, oral hygiene, diet, and experience in the COVID-19 pandemic.
Results: A total of 568 responses were collected, 547 of which were false responses from bots. Of the 11 legitimate responses, 3 were complete. Respondents reported that their child's oral health was either fair or poor (none chose excellent, very good, or good). At most, respondents said their child brushes once per day, and only one respondent reported use of floss. Lack of behavioral compliance, oral sensitivity, and lack of time were all factors that impacted oral care at home. Various respondents reported that their child snacks more than three times per day, is a picky eater, and receives snacks or sweets as a reward in behavioral management. In addition, caregivers said that COVID-19 resulted in: changes in their child's diet and snacking frequency, increased difficulty accessing dental care, reduction in toothbrushing frequency, and changes in cooperation during home oral care.
Conclusions: Children with special needs face challenges maintaining oral health through diet and oral hygiene, and the COVID-19 pandemic impacted both factors. The distribution methods utilized were not effective at garnering sufficient survey responses for

meaningful statistical analysis. Future research should increase distribution, identify better incentives for participation, and streamline the survey in order to attain more responses.
Support: The UCSF School of Dentistry Program in Global Oral Health

14) Title: SOX2 regulates tracheal and esophageal gene expression independently of NKX2-1

S. HUANG, A.E. LEWIS, J.O. BUSH

UCSF School of Dentistry, Department of Cell & Tissue Biology

Objectives: Transcriptional patterning of tracheoesophageal development is a complex process, and its disruption can lead to a spectrum of malformations in humans. NKX2-1 and SOX2 are transcription factors known to be early markers of the trachea and esophagus, respectively. Previous studies have suggested that NKX2-1 and SOX2 function as a co-repressive master regulatory switch that defines tracheal and esophageal cell fates, with loss of either resulting in a conversion of cell fate and tracheoesophageal fistula. However, recent work from our lab has determined NKX2-1 controls only a subset of the genes which are differentially expressed dorsoventrally. In the ventral foregut, some of the genes that change their expression upon loss of NKX2-1 do so because of upregulation of SOX2, whereas others are independent of SOX2. Conversely, SOX2 may regulate dorsal genes directly, or through repression of NKX2-1. Here, we aim to investigate the contribution of SOX2 regulation of tracheoesophageal identity and the extent to which it depends on NKX2-1.
Methods: Mouse embryos lacking SOX2 in the foregut endoderm, alongside controls, were dissected at E11.5 and cut transversely with a cryostat. RNAScope or Immunofluorescence was used to examine expression patterns of markers that were previously identified to be dorsoventrally differentially expressed.
Results: Our experiments survey previously identified dorsoventrally-restricted markers and reveal which markers exhibit perturbed expression upon loss of SOX2. Interestingly, whereas expression of several esophageal markers decreased in the dorsal foregut endoderm upon loss of SOX2, their expression was not similarly perturbed in the ventral foregut endoderm, even though SOX2 is expressed in the ventral foregut.
Conclusions: The data presented evidence that SOX2 may play a larger role than previously thought in specifying both esophageal as well as tracheal fates. It is also of particular note that regulation of genes by SOX2 may differ between the tracheal- and esophageal-fated foregut.
Support: UCSF School of Dentistry, NIH/NHLBI R01HL144785

15) Title: Investigating the role of Shrm4 and EPHRIN-B1 signaling in the secondary palate development

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Objectives: Craniofrontonasal syndrome (CFNS) is a rare developmental disorder caused by a mutation in X-linked Efnb1 gene. Paradoxically, female patients heterozygous for Efnb1 are more severely affected than patients homozygous/hemizygous for Efnb1. An abnormal, mosaic pattern of cell sorting is observed in mouse mutants heterozygous for Efnb1. Preliminary data shows that Efnb1 may interact with Shrm4 in craniofacial development, as knocking out both genes resulted in cleft palate 100% of embryos while knocking out Efnb1 alone was 42%. Efnb1 controls anterior palatal shelf outgrowth and midface shape. While the role of Efnb1 in craniofacial development has been extensively explored, not much is yet known about Shrm4. In this study, we investigate Efnb1 and Shrm4 in the context of secondary palate development.
Methods: wildtype (WT), Efnb1 het (Efnb1+/-), Shrm4 het (Shrm4+/-), compound het (Efnb1+/-; Shrm4+/-), Efnb1 null (Efnb1Y/-), Shrm4 null (Shrm4Y/-), compound null (Efnb1Y/-; Shrm4Y/-) embryos were collected. E13.5 and E14.5 embryos with the aforementioned genotypes were sectioned and immuno-stained for EPHRIN-B1 or examined in whole-mount using confocal microscopy. Multiple confocal stack images were acquired and reconstructed in 3D using Imaris software.
Result: Consistent with our lab's previous findings, (1) WT palates exhibit differential EPHRIN-B1 expression along the anterior-posterior axis (2) Efnb1+/- het palates exhibit mosaic expression of EPHRIN-B1 (3) Efnb1Y/- null palates exhibit no expression of EPHRIN-B1, as expected. Notably, Shrm4+/- het and Shrm4Y/- null palates exhibit a similar pattern as that of WT. Interestingly, Efnb1+/-; Shrm4+/- compound het palates exhibit a mosaic pattern but with clusters larger than those seen in Efnb1+/- het palates. Efnb1+/- het, Efnb1+/-; Shrm4+/- compound het, Shrm4Y/- null, Efnb1Y/-; Shrm4Y/-compound null palates all showed clefting and dysmorphology of the palate.
Conclusion: Shrm4 and Efnb1 play critical roles in secondary palate formation. They may be the molecular controls behind actomyosin cytoskeleton and CFNS pathogenesis.
Support: UCSF School of Dentistry, Department of Oral and Maxillofacial Surgery, NIH/NIDCR R01DE023337 and R01DE028751-01

16) Title: Differential expression of calcineurin/NFAT members in species with distinct midfaces

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Objectives: Craniofacial malformations are among the most common birth defects. Cellular and molecular programs underlying craniofacial development are mediated by multiple signaling pathways, including those directed by calcium. In humans, elevated intracellular calcium caused by mutations in CACNA1C leads to craniofacial defects in Timothy Syndrome. Intracellular calcium elevations activate downstream signaling, including the calcineurin (CaN)/NFAT cascade. Synergy between DYRK1A and RCAN1, two members of the CaN/NFAT pathway, reduces nuclear NFAT, with ensuing craniofacial abnormalities in Down syndrome patients. In mice, CaN/NFAT pathway components are highly expressed in the developing midface, and embryos treated with the CaN inhibitor cyclosporine A (CsA) exhibit decreased head and midfacial length. Here we use the chick, which displays distinct midface outgrowth, to determine whether differential expression of CaN/NFAT members is correlated with midfacial outgrowth across species.
Methods: Whole mount in situ hybridization (ISH) and qRT-PCR were performed on HH20 and HH22 chick whole embryos and micro-dissected midfacial prominences, respectively, to qualitatively and quantitatively assess expression of CaN/NFAT pathway members. Chick embryos are also being treated with CsA to evaluate the effects of CaN/NFAT inhibition on midfacial outgrowth.
Results: ISH and qRT-PCR demonstrated that most CaN/NFAT members exhibit similar expression patterns in chick and mouse embryos at equivalent stages. However, select CaN/NFAT members are expressed at different levels in distinct chick midface anlagen compared to mouse, potentially contributing to differential outgrowth of midfacial elements in the two species. CsA experiments in chicks will establish the functional involvement of this pathway in midfacial development across species.
Conclusions: Our findings demonstrate involvement of the CaN/NFAT pathway in murine midfacial morphogenesis and outgrowth. Similar expression patterns of CaN/NFAT pathway member transcripts in chick and mouse midfacial prominences suggest this pathway is conserved in these species but is likely deployed differently in select midfacial anlagen with distinct outgrowth.
Support: UCSF School of Dentistry, NIDCR R01DE028753-03

17) Title: Oral health engagement among adolescents with varying caries risk trajectories

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Objectives: Use qualitative interviews to better understand the oral health engagement (including behavior and habits) of adolescent dental patients.
Methods: Adolescent dental patients were recruited from Willamette Dental Group, a large accountable dental care organization with over 50 dental offices in Oregon. Purposive sampling was done to ensure representation of patients with private and public insurance, oral health trajectory (oral health risk levels that improved or did not improve over time) and program adherence. Twenty-four open-ended qualitative interviews were conducted via Zoom with patients aged 13-17. Each interview was transcribed and deidentified before getting analyzed in Dedoose, a qualitative data analysis software. Results were compared between adolescents who improved their oral health (n=9) and those whose oral health stayed the same or did not improve (n=15).
Results: There was overlap between the two groups regarding diet: both groups consumed large amounts of sugar and snacked frequently, exacerbated by COVID-19 restrictions. Toothbrushing took place in both groups to varying degrees, with adolescents having different motives for wanting to improve their oral health, such as getting braces or wanting to have nice breath in social settings. Those who improved their oral health discussed using prescription oral products regularly and following directions from dental providers. Majority of the adolescents in both groups did not floss regularly, but some were motivated to begin after experiencing decay or caries.
Conclusions: Adolescents who were able to improve their oral health discussed frequent brushing and adherence to following prescription product directions. Diet, social environment, and lack of consistent flossing were similar in both groups. Learning about existing decay and cavities served as motivation for adolescents to change their home oral hygiene behaviors.
Support: The Delta Dental Foundation and the National Institute on Minority Health and Health Disparities of the National Institutes of Health under award number R01MD013719.

18) Title: Do practice characteristics influence online ratings of oral and maxillofacial surgeons?

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Objectives: This perspective is the first to collect/evaluate online ratings for all Medicare-participating OMSs, including whether certain practice-specific factors influence ratings. As the popularity of rating sites increases, understanding their prevalence, influence, and possible bias is essential.

Methods: This cross-sectional study analyzed the Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use Files (2018). Total number of ratings and mean score (range 1-5) from four websites were obtained. Primary outcome variable was mean weighted online rating. Predictor variables included sex, setting, region, number of beneficiaries, number of services billed, and Hierarchical Condition Category (HCC), a measure of patient complexity. Descriptive statistics were computed for each variable ($\alpha = 0.05$).
Results: 634 rated OMSs were included. 102,803 Medicare services (mean number of services/provider, 162.15) were recorded for 40,762 beneficiaries (mean number of unique beneficiaries/provider, 64.29). Mean HCC seen by OMSs in this cohort was 1.28. This cohort comprised mostly men (n = 597; 94%).
Healthgrades had the most ratings (12442), followed by Vitals (4693), Yelp (2439), and RateMD (1403). Healthgrades had the highest average rating (4.46), with Yelp the lowest (3.75). Difference in means across websites was significant ($P < 0.001$). Mean weighted ratings for facility-based OMSs were 3.97, compared with 4.04 for office-based OMSs ($P = 0.90$). Female OMSs had similar ratings (4.08) to men (4.03) ($P = 0.54$).
Conclusions: No single predictor variable, including volume, complexity, characteristic (facility vs. office or rural vs. urban setting), or provider sex correlated significantly with ratings.
OMSs, especially those without established referral networks, can consider the websites most-frequented and the characteristics of those ratings. For payers/policymakers interested in pegging reimbursement of services to patient perceptions of surgeon quality, it may be premature for OMSs given variation between websites per provider and the inability to risk-adjust ratings within existing Medicare data.

19) Title: A Qualitative analysis of familial factors of adolescent e-cigarette and cannabis use

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Objective: Understand how adolescents describe the relationship between their family members and their knowledge, beliefs, access to, and use of electronic cigarettes and cannabis products.
Methods: Recruitment of California adolescents aged 14-17 years old occurred in two phases: Phase 1 from May-June 2020 drew from an existing cohort study of students at eight rural high schools; Phase 2 from December 2020-February 2021 recruited through online social media advertisements to parents of adolescents. Forty-seven participants were recruited (mean age = 15.63 years; 70% rural, 66% female). The participants completed one-hour, semi-structured interviews over Zoom. Participants were asked open-ended questions about their perceptions and experiences related to vaping and any other nicotine or cannabis products, including questions about house rules, access to products, and use patterns. Interviews were transcribed verbatim and de-identified. Transcripts were imported into the Dedoose Qualitative Data Analysis Software and coded and analyzed to identify the emergent themes.
Results: Some family factors, including having younger siblings, past punishment, and family history of use, served as deterrents from teens using products. Adolescents experienced a range of house rules around vaping and cannabis products, ranging from permissive to extreme. In households in which parents disapproved of use, adolescents sometimes experienced fear and guilt and had multiple strategies to hide products. Some adolescents described family members facilitating access to vaping or cannabis products including parents, siblings, and extended family. In some households, parent restrictions evolved as adolescents aged, viewing age 18 as a threshold in which adolescents were able to make their own choices.
Conclusions: Families are a varied, yet important, influence in adolescent vaping and cannabis use.
TCORS Project 4 funded by NIH Heart and Lung and Blood Institute and FDA Center for Tobacco Products (U54HL147127).
Support: The John C. Greene Preventive Dentistry Chair Fund

20) Title: The effects of a humanized gut microbiome on enamel formation

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Objectives: The goal of this project was to determine the effect of a human microbiome on the formation of fluorosed enamel and inflammation of the small intestine.
Methods: In a randomized parallel experimental study, humanized mice (HM), created through fecal transplant of gnotobiotic mice, were given 0, 10, or 25 ppm fluoride in drinking water, and gnotobiotic mice (GM) were given 0 or 25 ppm fluoride. After 5 weeks the animals were sacrificed, the proximal duodenum was sectioned, stained with H&E, and examined to assess signs of inflammation. Mandibles were removed and scanned by microCT. Relative density of a virtual slice through the incisor, located where the incisor erupted from the alveolar bone, was assessed using Amira software (Thermo Fisher) using standard Hounsfield Units. One-way ANOVA adjusted by the Bonferroni's multiple t-test was used to assess statistical significance ($p<0.05$). Timing of mineral formation was assessed relative to the location of a line drawn perpendicular to the distal border of the third molar.
Results: Enamel density was significantly lower in HM given 10 and 25 ppm fluoride in drinking water, as compared to controls ($p=0.007$). In GM, enamel density of mice given 25 ppm fluoride was lower, but the difference was not significant ($p=0.08$). MicroCT images showed an earlier initiation of enamel mineralization in HM 10 and 25 ppm groups as compared to HM 0 ppm, while there was no obvious difference in GM 0 and 25 ppm groups. Duodenum sections demonstrated more inflammatory infiltrate and less villi integrity in HM 10 ppm and 25 ppm than in HM 0 ppm group, while no obvious differences were observed between GM groups.

Conclusions: The presence of human gut microbiome plays a role in the tooth enamel biomineralization and these changes may be associated with inflammation of the small intestine.
Support: The Delta Dental Foundation, UCSF Center for Children's Oral Health Research.

21) Title: The effect of bone morphogenetic protein-2 (BMP-2) on volumetric and histometric outcomes for peri-implant defects in the animal model: a systematic review and meta-analysis

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Objectives: To investigate the effects of BMP-2 on the volumetric and histometric changes after treatments of peri-implant defects compared with the conventional approach in the animal model
Methods: A PICO question was defined to include animal studies with data on comparison of volumetric and/or histometric outcomes with and without the use of BMP-2 in treating peri-implant defects, with ≥ 5 animals in each study group. An electronic search of 4 databases and a hand search of peer-reviewed journals for relevant articles was performed. Weight mean differences (WMD) and confidence intervals (I) for the recorded variables were calculated using random-effect meta-analysis.
Results: Twenty-one randomized controlled trials (RCTs) in the animal model were included. The volumetric changes and histometric parameters in augmented sites of each study were recorded. The results of the meta-analyses showed that the WMD of bone to implant contact (BIC) with 4-8 weeks and 12-24 weeks of follow-up was 15.50% (95% CI= 3.28% to 27.72%, p= 0.01) and 16.17% (95% CI= 11.17 to 21.16%, p< 0.00001), respectively, favoring the BMP group. The WMD for the percentage of defect fill with 4-8 weeks and 12-24 weeks of follow-up was 15.88% (95% CI= 3.90 to 27.86%, p= 0.009) and 10.48% (95% CI= 0.95 to 20.02%, p= 0.03), respectively, favoring the BMP group. The WMD for the vertical bone gain was 1.63mm (95% CI= 0.58 to 2.67mm, p= 0.002), favoring the BMP group.
Conclusions: The use of BMP-2 in peri-implant defects showed a better clinical and histomorphometric outcome than non-BMP treated defects in the animal model.
Support: UCSF School of Dentistry, Department of Orofacial Sciences

22) Title: P75NTR-Deficient mice demonstrate defective temporomandibular joints

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UCSF School of Dentistry, Department of Orofacial Sciences

Objectives: Temporomandibular joint (TMJ) disorders, such as osteoarthritis, are detrimental to patient's everyday lives, and the current treatment involves using human mesenchymal stem cells (MSCs) to repair cartilage. Several studies have demonstrated that neurotrophins and their receptors may play a role in promoting chondrogenesis, including P75NTR, a nerve growth factor receptor often expressed in cartilage and used to select MSCs with great proliferative potential. Therefore, the aim of our study is to determine the effect of P75NTR on prenatal and postnatal mice TMJ development.
Methods: We collected data from both wild-type (WT) and P75NTR-knockout (KO) mice at different time points: E16.5, E18.5, P0, P14, and P28. First, we dissected, embedded, and sectioned the mice TMJs into 6 um sections. Then we performed histological staining with Safranin O, Hematoxylin and Eosin, and Alcian Blue, and we measured the lengths of the different cartilage zones for data quantification via ImageJ. Finally, we used immunohistology to measure cartilage marker SOX9 and COLX expressions within the TMJ region.
Results: For prenatal mice, there was no significant difference between the TMJs of WT and KO mice, but we demonstrated that postnatal KO mice TMJ's had defective condylar cartilages and articular discs. Immunohistology revealed that the mutant mice also had reduced cartilage marker SOX9 and COLX expressions, which indicates stunted cartilage development. These findings confirm that P75NTR is indeed an important gene in TMJ development in postnatal mice.
Conclusion: Now that we have confirmed P75NTR's significant role in chondrogenesis in the TMJ region, we would like to further investigate the molecular mechanisms of P75NTR-mediated TMJ development. Eventually, the results of our study may help clinicians develop a P75NTR recombinant protein that can be distributed as a drug for regenerative therapies.
Support: UCSF School of Dentistry, Department of Orofacial Sciences, NIH/NIDCR K08DE024603.

23) Title: Human craniofacial bone quality post-orthodontic treatment is age- and anatomy-specific

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Objectives: The objective of this study was to 1) map the changes in maxillary and mandibular alveolar bone mineral densities (MD) and volumes, and 2) correlate displacements of anterior and posterior teeth with changes in alveolar bone MD in patients undergoing orthodontic tooth movement (OTM).
Methods: Pre-and post-CBCT scans of OTM patients (10 adults - 35±3y.o.; 10 adolescents - 16±3y.o.; 2.5 years of treatment) were obtained from the clinics at UCSF. Following image registration of pre- and post-scans of each patient, the root displacements and

rotations, differences in maxillary and mandibular bone MD, and bone architecture surrounding the first molars and central incisors in each group were evaluated using AVIZO.
Results (see Figure): Adolescents: A significant increase in MD of bones surrounding maxillary molars (p=0.006) and central incisors (p=0.02), but no significant changes in the mandibular molars were observed post-OTM. MD of bones surrounding mandibular central incisors decreased significantly (p=0.0001). Adults: There was a significant reduction in MD of bones surrounding mandibular (p=0.03) and maxillary central incisors (p=0.001), as well as mandibular first molars (p=0.03), and no significant changes in MD of bones surrounding the maxillary first molars were observed post-OTM. The root displacement was positively and linearly correlated (R2=0.7) with ΔMD of bones surrounding maxillary central incisors in adolescents. No such relationship was observed in adults (data not shown).
Conclusions: Bone growth and density in adolescents without OTM to account for age-related growth and tooth-displacement effects are warranted. Craniofacial bone quality in humans with OTM is age- and anatomy-specific. The “plastic” nature of adolescent mandibular and maxillary bones permitted tooth displacement by an order of magnitude greater than the periodontal ligament space (~100-300μm) and bone MD recovery, underpinning the long-term effectiveness of OTM.
Support: UCSF School of Dentistry Presidential Chair Fund; UCSF Biomaterials and Bioengineering Correlative Microscopy Core; UCSF Clinics of the Division of Orthodontics

24) Title: Mandibular dysmorphology contributes directly to cleft palate in Pierre Robin sequence

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Objectives: Pierre Robin sequence (PRS) is a clinical triad of micrognathia, glossoptosis, and airway obstruction, that often involves cleft palate and is associated with disruption in enhancers of SOX9. Direct causation between mandibular hypoplasia and cleft palate has not been established. This study aimed to determine the role of micrognathia on palatal shelf development utilizing a PRS mouse model with deletion of Sox9 specifically in the mandibular mesenchyme.
Methods: The Hand2Cre mouse model was used to drive loss of Sox9 specifically in the mandibular mesenchyme. Sox9fl/fl;Hand2Cre (mutant) and control (Cre-negative) samples were collected at embryonic day (E)18.5., and micro-computed tomography (microCT) was performed on the skulls (N=8 mutant, 6 control). Data were processed, segmented, and landmarked using 3DSlicer, and geometric morphometric analysis was performed on the mandible and cranium to assess morphological variation. Histology was performed on E14.5, E16.5, and E18.5 skulls to reveal differences at the tissue and cellular level.
Results: Loss of Sox9 in the mandible only (and not palatal shelves or surrounding tissue) resulted in delayed palatal shelf elevation and clefting of the secondary palate, with 100% penetrance in the samples analyzed. At E14.5 and E16.5, histological images show palatal shelves were in the vertical orientation in the mutant while the shelves were elevated at E14.5 and fused at E16.5 in control. At E18.5, there was a wide cleft of the secondary palate, and the secondary palate bones were undersized, dysmorphic, and laterally displaced in mutants compared to control. The mandibular bones were smaller in Sox9fl/fl;Hand2Cre embryos, with most missing coronoid processes and having shorter/wider condylar processes compared to control.
Conclusions: Deletion of Sox9 in the mandibular mesenchyme was sufficient to cause micrognathia, palatal shelf elevation delay, and cleft palate in mice. These findings provide genetic evidence of a direct association between mandibular retrognathia and cleft palate.
Support: Dr. Ophir Klein, NIH/NIDCR K08DE028011 to A. Goodwin

25) Title: Assessing black dentists’ contributions to Adult’s Oral Health in Medi-Cal Dental

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UCSF School of Dentistry, Preventive and Restorative Dental Sciences, Philip R. Lee Institute for Health Policy

Objectives: Nationally, Black dentists are more likely to participate in Medicaid than their non-Black peers, while the Black community disproportionately depends on Medicaid for dental treatment. This project evaluates barriers and facilitators of Black dentists’ participation in California’s Medi-Cal Dental program, which has the second lowest provider participation rate in the US.
Methods: The 2017 ADA Masterfile was analyzed to assess provider’s willingness to accept Medicaid patients as a function of provider race in California. Qualitative interviews with dental providers and stakeholders assessed the current Medi-Cal Dental landscape for Black dentists and patients.
Results: Black dental providers are nearly 4x more likely to work in an FQHC and over twice as likely to accept Medi-Cal dental than their non-Black peers. Black dentists noted laborious pre-authorization requirements as a main barrier to quality of care and friction point for their involvement. Limited restorative coverage deterred provider involvement, particularly in the Fee-For-Service model. Despite these challenges, Black dentists highlighted deep ties to community and personal motivations as drivers of participation and value in serving Medi-Cal populations. Dental educators interviewed highlighted pre-dental pipeline programs as the primary driver of increasing provider diversity, while externship programs are being used for dental student exposure to Medi-Cal populations. Investment in student loan repayment programs is one current policy strategy to improve provider participation in Medicaid.
Conclusion: Black dentists in California stand out in their commitment to public sector dentistry. Strong personal motivations drive involvement despite noted challenges in the Medi-Cal program. Creating a dental workforce that better resembles and has stronger connections to the community it serves presents a robust approach to improve provider participation in Medi-Cal Dental despite an

everchanging state budget. Still, investments in both workforce diversity and the Medi-Cal program directly are needed for lasting improvements in access to and quality of care.
Support: The Delta Dental Foundation

26) Title: Combined PTH and LA-PTH therapies promote anabolism in axial skeleton with impact on structural parameters of mandible

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Objectives: Osteoporosis has been linked to skull abnormalities such as tooth loss. Studies of osteoporosis therapies on regions of the skull are limited. Current PTH and (Long-Acting) LA-PTH therapy have a detrimental hypercalcemic side-effect. A novel combined PTH/LA-PTH and calcimimetics prevents hypercalcemia and produces synergistic anabolism in axial bone. We tested whether PTH, LA-PTH, and either in combination with calcimimetic therapies also impact the mandible by comparing skeletal parameters in treated mice.
Methods: 3-month-old male mice (N=5/group) were injected subcutaneously for 4 weeks daily with vehicle, 40μg PTH(1-34), 40μg LA-PTH, or either drug in combination with 20μmol NPS-R568. Skulls were subsequently dissected and analyzed using μCT technology with the region of interest focusing on alveolar bone adjacent to molars, developing coronal sectioned images encompassing the entire mandible were analyzed by SCANCO custom analytic software for standard bone parameters including tissue volume, bone volume, BV/TV, connectivity density, and trabecular number. Means and standard deviations were determined along with completion of 2-tailed tests and percent change comparing the study groups.
Results: Total volume and bone volume increased by 8.1% and 7.6%, respectively in LA-PTH treated mice when compared to vehicle control. This is further corroborated by dramatic increased in trabecular connectivity (69%), number (28%), and bone surface (46%). There is no significant difference in these parameters between vehicle and PTH, PTH/calcimimetics, and LA-PTH/calcimimetics groups.
Conclusion: Osteoanabolic regimens (i.e. PTH, LA-PTH, and PTH/LA-PTH with calcimimetics) for axial skeleton may have an effect on the mandible as a whole. Subregions of the mandible are being analyzed to test whether areas subjected to different mechanical loading (e.g. alveolar bone vs TMJ) may have differential response to drug treatments. Mechanisms underlying the differences require subsequent studies delving into other regions of the skull to examine whether our novel regimen is region-dependent.
Support: UCSF School of Dentistry, Department of Oral and Maxillofacial Surgery

27) Title: Concept design for an oral device to mitigate the sensation of oral dryness

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Objective: To design a prototype intraoral device that can deliver fluid to the oral cavity from an extraoral source to alleviate the sensation of oral dryness.
Methods: The project seeks to deliver small amounts of fluid to the oral cavity at a designated rate to decrease the effects of symptomatic oral dryness. An oral device is custom designed to be safe, comfortable, cost effective, and accessible.
Results: An intravenous mini drip set-up is adapted to deliver a balanced salt solution to the oral cavity to simulate unstimulated salivary flow from the parotid gland. The flow of fluid may be custom titrated for patient comfort and safety
Conclusion: Given the aging population, the consumer market for a device to mitigate the sensation of oral dryness is significant. The target population includes, but is not limited to, those who suffer xerostomia from medication usage, radiation therapy to the head and neck, and Sjögren's disease. This project presents a prototype oral device to simulate the delivery of saliva to the oral cavity.

28) Title: Treatment outcomes of presurgical orthodontic alignment in alveolar cleft reconstruction

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Objectives: Presurgical orthodontic treatment is an important step in the success of alveolar bone grafts in individuals with alveolar cleft defects. In presurgical orthodontics, it is standard practice to perform maxillary arch expansion, which addresses maxillary constriction and creates space for placement of graft material. The role of anterior tooth alignment as a presurgical orthodontic intervention has yet to be fully explored, considering the direct proximity of some anterior teeth to the cleft area. This study aims to compare treatment outcomes of alveolar cleft reconstruction in patients who undergo only maxillary expansion (control group) versus those who undergo maxillary expansion paired with anterior tooth alignment (alignment group). This study uses cone-beam

computed tomography (CBCT) to provide the first clinical evaluation of volumetric, root coverage, and bone formation comparisons between these two treatment modalities.
Methods: A retrospective, two-center study of 24 patients with unilateral cleft lip and palate (UCLP) was conducted. The alveolar bone defect volume was evaluated on preoperative and postoperative CBCT scans using a standardized protocol. The surgical outcome was assessed in relation to the (1) bony coverage of the cleft-adjacent incisor, (2) size of the graft bridge, (3) Chelsea scale classification of bone formation, and (4) volumetric bony fill.
Results: In the alignment group, the average percentage bone fill was 69%, while the mean percentage bone fill in the control group was 47%. Bony coverage of the cleft-adjacent incisors decreased between preoperative and postoperative scans in the alignment group.
Conclusion: Anterior tooth alignment paired with maxillary expansion prior to secondary alveolar bone grafting in individuals with UCLP could contribute to an increased alveolar bone fill assessed from the volumetric outcomes using CBCT-derived measurements. Despite a more successful graft outcome, root exposure of cleft-adjacent teeth to the cleft site is a potential risk during anterior orthodontic alignment.
Support: UCSF School of Dentistry, Department of Orofacial Sciences

29) Evaluating the impact of multilevel factors on pediatric oral health-related quality of life

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1) UCSF School of Dentistry, Center to Address Disparities in Children's Oral Health 2) Harvard University, Center for Health Decision Science 3) Willamette Dental Group

Objectives: Tooth decay impacts social, emotional, physical, nutritional, and intellectual areas of children's quality of life. The study's objective was to understand the multifactorial effects as per the Fisher-Owens conceptual framework incorporating genetic, social, and environmental risk factors of child-, clinical-, and community-level factors on pediatric oral-health related quality of life (OHRQoL).
Methods: Parents and children having at least one recent prior visit at Willamette Dental Group, a dental accountable care organization in Oregon, were eligible to complete the Pediatric Oral health-related Quality of Life (POQL) survey. The POQL instrument was offered in both English and Spanish, ranging from 0 (best QoL) and 100 (worst QoL). The study population consisted of 698 children and teens ages 3-18. Data were analyzed using Stata (Stata/MP 16.1 for Windows). Negative binomial regression analysis evaluated the impact of multilevel factors on OHRQoL.
Results: Increased patient age (ratio of expected POQL between two consecutive age groups 1.24; 95% CI 1.14-1.35), dental fear (1.04; 1.00-1.08), and DMFT (1.75; 1.19-2.57) were associated with decreased OHRQoL, while brush frequency (0.83; 0.71-0.96) and Spanish-language preference (0.55; 0.34-0.88) were associated with increased OHRQoL. Female patients (1.45; 1.15-1.82) had less-favorable OHRQoL compared to male patients. Patients with public insurance (1.32; 1.04-1.67) also had less-favorable OHRQoL compared to patients with private insurance. New patients and patients under 3 years old (1.46; 1.11-1.93) had a less-favorable OHRQoL compared to continuing-care patients. A child's race, caries risk, and underlying medical conditions did not influence OHRQoL, nor did rurality, poverty, or inequality in their community of residence.
Conclusions: Child-level factors were the strongest determinants of OHRQoL. As we continue to study children's oral health, it is crucial to understand the many factors that affect self-perceived quality of life. Addressing these needs should result in an improved pediatric OHRQoL.
Support: The UCSF School of Dentistry Program in Global Oral Health**,** National Institute of Dental & Craniofacial Research of the National Institutes of Health under award number UH2DE025504; National Institute on Minority Health and Health Disparities of the National Institutes of Health under award number R01MD013719

30) Title: Impact of rapid palatal expansion on the size of adenoids and tonsils in children

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Objectives: Adenoid and tonsillar hypertrophy in children often leads to adverse respiratory symptoms and obstructive sleep apnea (OSA). Current clinical guidelines from the American Academy of Pediatrics and American Academy of Otolaryngology–Head and Neck Surgery recommend tonsillectomy as the first line of pediatric OSA treatment for children with tonsillar hypertrophy. Rapid palatal expansion (RPE) performed by orthodontists improves obstructive sleep apnea in children by reducing nasal airway resistance, increasing nasal volume, raising tongue posture, and enlarging pharyngeal airway. However, the role of RPE in alleviating adenoid and tonsillar hypertrophy remains elusive. In this study, we aim to evaluate the changes in adenoid and palatine tonsil sizes following RPE using 3D volumetric analysis of cone beam computational tomography (CBCT) imaging.

Materials and Methods: In this retrospective cohort study, a total of 60 pediatric patients (mean age: 8.00, range: 5-17, 32 females and 28 males) who had tonsillar hypertrophy (size 3 and 4) were included and divided into a control group (n=20) and expansion group (n=40). The control group did not undergo any treatment. The expansion group underwent expansion using a conventional Hyrax expander, activated 0.25mm per day for 4 to 6 weeks. Final CBCT scans (T2) were performed 9-12 months after the initial scan (T1), pediatric sleep questionnaire (PSQ) and BMI were obtained at each timepoint. Volumetric analysis of adenoid and palatine tonsils was performed using a combination of bony and soft tissue landmarks in CBCT scans through Anatomage InVivo 6 imaging software. Paired t-tests were used to evaluate the difference between the initial and final adenoid and tonsil volumes. p values less than 0.05 were considered statistically significant.
Results: Compared to the control group, the expansion group experienced a statistically significant decrease in both adenoid and tonsil volume. There was non-statistically significant increase in volume from T1 to T2 for the control group. For the expansion group, 90% and 97.5% of patients experienced significant reduction in adenoid and tonsil volume, respectively. The average volume decrease of adenoids was 16.8% while that of tonsils was 38.5%. The patients had up to 51.6% and 75.4% reduction in adenoid and tonsil size, respectively, following RPE orthodontic treatment. Pearson correlation ranged from 0.88-0.99 for each measurement, representing excellent internal consistency. There was a significant reduction in the PSQ scores from 5.81±3.31 to 3.75±2.38. ($p<0.0001$).
Conclusions: Our results demonstrated that RPE significantly reduced the size of both adenoid and palatine tonsils and revealed another long-term benefit of RPE treatment. To our knowledge, this is the first study to quantify the changes of adenoids and tonsils following RPE. This may show the possibility of considering RPE treatment as a valid and effective treatment option before proceeding to adenotonsillectomy for pediatric OSA population with narrow high arch palate and adenotonsillar hypertrophy.
Support: UCSF: Division of Orthodontics, School of Dentistry, Department of Orofacial Sciences, Division of Oral Pathology, Oral Radiology and Oral Medicine; Stanford University: Division of Sleep Medicine and Division of Sleep Surgery; Inspired Orthodontics

31) Title: Uncovering the roles of Lemd2 in craniofacial development

Y. YU, V. HERMOSILLA AGUAYO, Y. ZHENG, L. SELLERI

UCSF School of Dentistry, Department of Orofacial Sciences, UCSF School of Medicine (Y. Zheng)

Objectives: Disruption of the nuclear envelope (NE), which shields the genome thus enabling gene expression, results in recruitment of ESCRT (Endosomal Sorting Complexes Required for Transport) protein CHMP7 by nuclear membrane protein LEMD2. In turn, CHMP7 recruits late-acting ESCRT proteins for NE repair. Loss of NE integrity occurs in cellular processes such as migration and cell division, as well as aging and cancer. Cell migration and proliferation are key events in craniofacial development, as cranial neural crest cells (CNCCs) migrate and proliferate to form skeletal and connective tissues of the head. In humans, mutations in genes involved in NE repair have been associated with progeria, a syndrome accompanied by craniofacial anomalies. Thus, we hypothesize that a LEMD2-ESCRT axis plays essential functions during craniofacial morphogenesis.
Methods: Lemd2 and Chmp7 expression was assessed by whole-mount in situ hybridization (ISH) and immunofluorescence (IF) in wild-type mouse embryos. Morphology of mouse embryos harboring constitutive Lemd2 loss-of-function (Lemd2 KO;ActinCre/+;Lemd2-/-) and CNCC-tissue-specific Lemd2 inactivation (Lemd2 cKO;Wnt Cre/+;Lemd2fl/fl) versus control embryos was evaluated between gestational days (E)10.5-12.5. CNCC migration was visualized by IF and ISH of CNCC markers in E9.5-E10.5 Lemd2 cKO embryos. Gene expression and protein levels were assessed by quantitative polymerase chain reaction and Western blot using midface tissue from E12.5 Lemd2 cKO embryos.
Results: LEMD2, CHMP7, and other ESCRT proteins are enriched in craniofacial domains populated by migrating CNCC in early development. Lemd2 KO embryos exhibit embryonic lethality between E10.5-E11.5, displaying drastic craniofacial defects at E11.5 (6/6, 100% penetrance). Tissue-specific inactivation of Lemd2 in CNCCs results in craniofacial abnormalities, including smaller mid-face and stunted snouts (5/16, 33.3% penetrance), with no detectable perturbation of CNCC migration.
Conclusions: Altogether, our results support a tissue-specific role of LEMD2 in CNCCs during face morphogenesis. Additional studies will dissect molecular events underlying the reported morphogenetic abnormalities.
Support: The UCSF Presidential Chair Fund, NIH, R01 DE028753

32) Title: SATB1 modulates ameloblast histone modification and enamel matrix protein expression

M. ZHOU, Y. ZHANG

UCSF School of Dentistry, Department of Orofacial Sciences

Objectives: A thorough understanding of enamel formation is critical in developing treatments for defective enamel, such as in amelogenesis imperfecta or traumatic injury. Secretory stage ameloblasts secrete enamel matrix proteins (EMPs) to build up the full thickness of organic matrix. Specific AT-rich sequence binding protein 1 (SATB1) is a chromatin organizer essential for enamel formation. RNA-seq data showed that deletion of SATB1 decreased the expression of EMPs, ameloblastin and enamelin, in secretory ameloblasts (SABs). Genome browser analysis identified a potential SATB1 binding site and a histone acetylation (H3K27ac) enhancer site, both in close proximity to the ameloblastin and enamelin genes. Based on this preliminary data, the present study aimed to investigate the roles of SATB1 and histone acetylation in co-regulating ameloblastin and enamelin.
Methods: RNAscope assay was used to visualize the effect of SATB1 on ameloblastin and enamelin in in-situ ameloblasts. Immunohistochemistry was performed on Satb1+/+ and Satb1-/- mouse incisor sagittal sections, using rabbit anti-H3K27ac primary antibody. Resulting samples were imaged with confocal microscopy and mean fluorescence was calculated. In addition, an organ culture experiment was performed to investigate the correlation between histone acetylation and EMP expression. Hemimandibles

were extracted from P5 mice and cultured in DMEM only or DMEM with 10uM trichostatin A (TSA), a histone deacetylase inhibitor. After 24 hours, the first molars were microdissected for RNA extraction and quantitative PCR to compare enamelin and ameloblastin expression levels.
Results: SATB1 deletion delayed the onset and reduced levels of enamelin and ameloblastin expression. Immunofluorescence imaging revealed significantly reduced H3K27ac levels in the Satb1-/- SABs. In addition, the TSA-treated first molar SABs exhibited greater than a four-fold increase in ameloblastin and enamelin levels.
Conclusions: The findings demonstrate that SATB1 is critical for histone acetylation status which, in turn, activates transcription of EMPs, an essential component of healthy enamel development.
Support: UCSF School of Dentistry, R01 DE027076 to Dr. Yan Zhang

II. GRADUATE CATEGORY

33) Title: Applied technique for improved bacterial recovery from human oral samples

M. BACINO (1), S. LYNCH (2)

1) UCSF School of Dentistry, Oral and Craniofacial Sciences Graduate Program 2) UCSF School of Medicine, Department of Medicine, Division of Gastroenterology

Objectives: Standard processing of low burden microbial samples, including oral samples, lead to over representation of host DNA in sequencing reads which diminishes the depth of microbiome sequence coverage. The objective of this study is to establish a technique for depleting host DNA while maintaining the integrity of bacterial genomic DNA (gDNA), thus enhancing microbial sequence information in oral microbiome studies.
Methods: We used mouthwash samples of n= □4 individuals which were pooled and divided into two treatment group: a control group where gDNA is isolated without host DNA depletion, and a second group where host DNA depletion precedes high molecular weight gDNA isolation. We determined the resulting gDNA integrity by running each sample on an agarose gel with a high range ladder prior to determining the degree of host DNA depletion by calculating the ratio of human (human KRAS) to bacterial (16S rRNA) biomarker copy number in host depleted and untreated samples using quantitative PCR (qPCR). This protocol was repeated three times.
Results: Both control and host depleted samples produced high molecular weight gDNA. qPCR data indicated an average of a 9.17-fold decrease in host DNA in the treated sample when compared with the untreated sample. This decrease in host DNA was paired with an average of a 1.76-fold increase in bacterial DNA.
Conclusions: As the field of oral microbiome research expands, it is vital to establish protocols that allow for comprehensive analysis of human microbial samples. Depletion of host DNA in human oral samples is achievable and will improve the quality of data for oral microbiome research.
Support: OCS Graduate Program, Dr. Larry Berkelhammer for his generous philanthropic gift which supports these studies.

III. RESIDENT CATEGORY

34) Oral Presentation Title: Do cariology and periodontology receive equal emphasis in dental education? A comparison of two investigations conducted 13 years apart.

G. CHONG

UCSF School of Dentistry, Department of Preventive and Restorative Dental Sciences, Division of Oral Epidemiology and Dental Public Health

Aim: The aim was to test the null hypothesis that periodontology and cariology receive equal emphasis in dental education.
Materials and Methods: An online search was conducted in Nov 2021 of all the dental schools in ten English-language speaking countries (U.S., Canada, U.K., Ireland, South Africa, Australia, New Zealand, Singapore, Hong Kong, and Malaysia) to identify departments/divisions in the disciplines of periodontology, cariology, and conservative/restorative/operative dentistry. The results were then compared against the findings of a similar investigation that was conducted, 13 years ago, from July to October 2008.
Results: Of the 126 dental schools identified in 2021, information was available for 93 dental schools. Of these 93 schools, only 7 listed departments/divisions/disciplines of cariology, whereas 83 and 86 schools had listed periodontology and conservative/restorative/operative dentistry, respectively. There is an increase in the number and proportion of dental schools with a department/division/discipline of cariology from 2008 to 2021. However, this pales in comparison with the increase in departments/divisions/disciplines of periodontology and conservative/restorative/operative dentistry. Additional information on research output was available for 90 dental schools in 2021, where 30 schools self-identified as undertaking cariology research, whereas 68 and 47 schools undertook research in periodontology and conservative/restorative/operative dentistry, respectively.
Conclusions: Dental education does not give equal emphasis to periodontology and cariology, and the discipline of cariology is grossly neglected. This has resulted in the continuation of an operative approach to dental caries which is unable to address the magnitude of the public health problem of untreated dental caries at a global level.

35) Title: A multi-partner network to implement a school-based virtual dental home program in rural schools in California

H. MEGALLY (1), J. CALVO (2)

1) UCSF School of Dentistry, Department of Preventive & Restorative Dental Sciences, (2) UCSF School of Dentistry, Department of Orofacial Sciences, Division of Pediatric Dentistry

Objective: To describe the partnership established to implement a Virtual Dental Home (VDH) program at schools in rural areas within Tuolumne County, California.
Methods: The UCSF VDH is a clinical collaboration between Smile Keepers Dental Program (SKDP) which is a school based oral health promotion program, UCSF Pediatric Dentistry, and local dentists in rural Tuolumne County, California. Through this program, Registered Dental Hygienists in Alternative Practice (RHDAPs) with the SKDP; collect medical history and dental history, capture radiographs and intra-oral photographs, perform dental prophylaxis, apply fluoride varnish, and provide oral health counseling to school students on their respective campuses. The records collected by the RDHAPs are securely transferred through a shared electronic dental record to UCSF, where Pediatric Dental faculty and trainees comprehensively review the records and electronically return treatment recommendations to the RDHAPS including directing the placement sealants, silver diamine fluoride, and interim therapeutic restorations. For the limited number of elementary school and middle school students with advanced dental needs that cannot be completed in the school setting, SKDP/UCSF provides coordinated referrals and case management to obtain restorative and surgical care with local dentists collaborating on the project, before the children return for routine preventive care at the school site. This innovative coordinated system allows children to access dental care and preventive dental treatments through the VDH by removing barriers such as the limited number of dental providers in their rural community, and challenges families would face by missing work and school to travel to dental visits in traditional dental offices.
Results: The program progress will be assessed through specific evaluation measures to identify successes in achieving program objectives and to indicate areas for improvement.
Conclusion: This collaboration aims at addressing some of the barriers families residing in rural areas may challenge to access dental care for their children.
Support: UCSF Open Smiles Collaborative

36) Title: Evaluation of nasal septum deviation via reformatted computed tomography (CT) imaging following expansion using RPE and MARPE

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UCSF School of Dentistry, Department of Orofacial Sciences, Division of Orthodontics, UCLA School of Medicine, Massachusetts General Hospital, Harvard University, Pediatric Dentistry

Objective: To evaluate whether rapid palatal expansion (RPE) or miniscrew-assisted rapid palatal expansion (MARPE) affects nasal septum deviation (NSD).
Materials and Methods: The study population includes 15 RPE patients ages 9.5 $\pm$ 1.4 years and 15 MARPE patients ages 17.39 $\pm$ 5.71 years with initial diagnostic cone-beam computed tomography (CBCT) scans (T0). Another CBCT scan (T1) was taken after patients underwent RPE or MARPE expansion treatment alone. NSD was evaluated three-dimensionally using a custom landmark analysis on T0 and T1 CBCT scans. Principal component analysis (PCA) and canonical variate analysis (CVA) were used to identify nasal septum shape differences before and after expansion treatment.
Results: PCA and CVA showed that while there was change in nasal septum shape from T0 to T1 for MARPE and RPE treatments, the general pattern in morphological change was not found when comparing the variety of phenotypes between individuals. The Procrustes ANOVA regression found p-values for MARPE centroid size and shape were 0.75 and 1, and RPE centroid size and shape were 0.64 and 0.25, respectively, suggesting that there were no significant differences in nasal septum size and shape following expansion. CVA found p-values were 0.99 for MARPE and 1 for RPE after 10,000 permutation tests for Procrustes distances, indicating that there were no significant differences between T0 and T1 group means for both treatment groups.
Conclusions: MARPE and RPE expansion treatments had no effect on nasal septum deviation from T0 to T1.

V. LITERATURE REVIEW

Oral Presentation Title: Implants vs Endo: as the pendulum swings

P. SRIVASTAVA

UCSF School of Dentistry, International Dentist Program

Background: The standard of care for a pulpally involved non vital tooth is endodontic treatment to preserve the natural tooth. There occurs a great variability amongst doctors today when treating a pulpally involved teeth with questionable prognosis and Conflicting studies have led to confusion among the clinicians.
Aim: To try and summarize the success criteria for implants and endodontically treated tooth and define why the survival of implants have often been termed as a success.

Materials and Methods: A literature review is taken from studies published from 2005-2019 concerning with success criteria of implants and Endodontics and discuss the rationale for both.
Results: Identification for both implants and Endodontics treatment as valid and contemporary to each other rather than versus each other.

VI. CLINICAL CASES

Oral Presentation Title: Case exploration of clinical and restorative considerations for patient's existing temporary holding care

K. KUMAR, P. YOUNG, D. NGUYEN

UCSF School of Dentistry

Background: Much of the treatment decision-making in dentistry exists in a gray area, requiring consideration of patient age, systemic health, individual preferences, finances, and treatment they've already received by the time they present. A 66 year old female patient presented to UCSF Predoctoral Dental Center seeking comprehensive oral evaluation after receiving most of her dental restorative care decades ago internationally.
Exploration: Of interest, the patient's exam yielded a bridge spanning #6-13 composed partially of splinted porcelain crowns and partially of composite resin applied over a metal mesh framework, anchored in existing teeth via multiple wide intra-canal posts.
Methods: As in illustrative educational case, this presentation walks through endodontic, prosthodontic, periodontic, and restorative factors in this restoration that are influencing and/or inducing the patient's currently unfavorable to hopeless bridge prognosis, supported by radiographs, periodontal charting, and intraoral photography. Further, we consider literature evaluating which aspects of this treatment modality -- wire splinting mesh, direct composite crowns, and this particular endodontic post selection -- might be unconventional currently within UCSF but are not beyond the realm of possibility in patient care, whether permanent or palliative.
Results: The patient elected for no treatment. We present the alternative treatment options given to the patient: 1) Extraction with definitive RPD or implant-supported FPD prosthesis. 2) Apicoectomy of pathology-associated root apices and recontouring of existing composite to facilitate improved hygiene. 3) Sectioning of mesh at sites #8,9 to be replaced via stayplate. Individual evaluation of existing crowns to consider post removal, RCT retreatment, and full-coverage crowns.

Oral Presentation Title: Treatment options for severely mobile teeth

E. WELTER, D. NGUYEN

UCSF School of Dentistry

Background: Tooth mobility in permanent teeth can be caused by one or a combination of factors such as: physical trauma or injury to tooth, malocclusion, periodontitis including reduced periodontium and bone loss, cysts or tumor in the jaw, periapical abscess, etc. Symptoms commonly associated with tooth mobility are: pain or discomfort, difficulty chewing, redness or inflammation around the tooth. Treatment options for severely mobile teeth include: no treatment, addressing etiologies such as deep cleaning to prevent further progression, non-surgical treatments of splinting teeth, and surgical treatments of tissue and bone grafting.
Aim: The goal was to identify the etiology(s) of the patient’s severe tooth mobility and provide comprehensive treatment options with respective prognoses that addressed the patient’s chief complaint, complex medical history, and short and long term treatment plan.
Materials and Methods: Tooth mobility was assessed using the Miller Classification of Mobility. Prognoses and treatment options were informed by a comprehensive oral exam, radiographs, and specialty consults from a periodontist and prosthodontist.
Results: After a comprehensive oral exam with consult with periodontist and scaling-and-root-planing treatment, teeth #24 and #25 had a mobility of III and tooth #26 had a mobility of I. After reviewing the various risks, benefits, and prognosis of different treatment options with the patient, the patient elected to have the teeth extracted to be replaced with a removable partial denture. Patient is considering dental implants with possible tissue and bone grafting for future treatment.

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