University of Illinois Chicago
College of Dentistry

Clinic and Research Day

February 27, 2025

UIC Student Center West
828 S. Wolcott Ave.
Chicago, IL 60612
(312) 996-7515

Contents

Schedule of Events

Location: Second floor, Student Center West, 828 S. Wolcott Ave., Chicago, IL

8:30 a.m.-noon	**Registration**	Foyer
9:30-11:00 a.m.	**Poster Session #1**	Poster Area
11:00 a.m.-noon	**Keynote Speaker:** **Dr. Jennifer Webster-Cyriaque** Acting Director, National Institute of Dental and Craniofacial Research, National Institutes of Health	Thompson Hall
Noon-1:00 p.m.	**Lunch**	Foyer
1:00-2:30 p.m.	**Poster Session #2**	Poster Area
2:30-3:30 p.m	**Faculty and Sponsor Speakers:** **Dr. Ana Bedran-Russo** Associate Dean for Research; Professor and Head, Department of Oral Biology "Overview of UIC College of Dentistry Research" **Dr. Christine D. Wu** Professor, Pediatric Dentistry "Professional Excellence and Commitment to Dental Research, Innovations, and Lasting Impact"	Thompson Hall
3:30-4:00 p.m.	**Awards Ceremony**	Thompson Hall

Dr. Susan Rowan

Welcome to the 38th annual Clinic and Research Day of the University of Illinois Chicago College of Dentistry, held this year for the first time at UIC's Student Center West.

The UIC College of Dentistry is a hub of research, education, and patient care situated in the dynamic city of Chicago. Much like our institution, the city continually revitalizes itself, and our commitment to research aligns with this spirit of transformation.

Today's science and research landscape thrives on expansive collaborations that transcend traditional boundaries. In line with this, we are committed to our research enterprise, investing in team science, fostering connections, and establishing meaningful partnerships across campus and within the diverse communities of Chicago and beyond.

Our postgraduates, students, and faculty engage in a spectrum of research endeavors, ranging from fundamental research to public health initiatives, the development of best practices in dentistry, innovative dental education, and groundbreaking advancements in diagnostics, artificial intelligence, biomaterials, and regenerative dentistry/medicine.

Dr. Ana Bedran-Russo

Thanks to collaborative teams of clinicians, researchers, and students, the College ranks highly in annual research funding from the National Institutes of Health. Research funding comes from the National Institute of Dental and Craniofacial Research, other National Institutes of Health, other federal agencies, foundations, and corporate and philanthropic contributions.

This event brings our College community together and provides a platform for students and postgraduates to showcase their research achievements to peers, faculty, alumni, and the broader research community—a testament to the strength of our commitment to UIC and the greater Chicago research environment.

As you immerse yourself in Clinic and Research Day, we invite you to witness firsthand how we are actively contributing to 'Better Oral Health Through Transformative Innovation.'"

Thank you for your participation!

Susan Rowan, DDS, MS
Dean and Clinical Professor of Restorative Dentistry

Ana Bedran-Russo, DDS, MS, PhD
Associate Dean for Research; Professor and Head, Department of Oral Biology; and Lead, 2025 Clinic & Research Day Committee

Welcome from the Scientific Committee

Dr. Sobia Bilal.

Dr. Mateusz S. Wietecha.

On behalf of the Scientific Committee, it is our distinct pleasure to welcome you to the 38th Annual Clinic and Research Day at the University of Illinois Chicago College of Dentistry. This annual event is a celebration of innovation, collaboration, and excellence in dental and craniofacial research, education, and practice.

This event shines a spotlight on the dedication and hard work of students across all levels, from undergraduate volunteers to dental students, residents, graduate students in our MS and PhD programs, postdoctoral fellows, and research associates. Their efforts, guided by the exceptional mentorship of our world-class faculty, are the foundation of the accomplishments we celebrate today.

This year, we are honored to feature an exceptional keynote speaker, Dr. Jennifer Webster-Cyriaque, Deputy Director of the National Institute of Dental and Craniofacial Research at the National Institutes of Health. Dr. Webster-Cyriaque is a distinguished clinician, researcher, and leader whose insights and expertise will undoubtedly inspire and enrich our community.

We are also proud to highlight the achievements and innovations of our very own UIC faculty through presentations by two of our esteemed colleagues. Their talks will provide a window into the groundbreaking research and contributions being made right here at the College of Dentistry.

Beyond the scientific sessions, this year's event offers an opportunity to engage with leading commercial sponsors showcasing their latest products and technologies. We extend our gratitude to all sponsors, and in particular, our Gold Sponsors: Envista, Dhillon Digital Solutions, and Wolf of Arches. Their support plays a vital role in making this event a success.

As we come together to share knowledge, foster collaboration, and celebrate achievements, we are reminded of the critical role research and innovation play in advancing oral health care and improving lives.

Thank you for joining us in this important endeavor. We look forward to an inspiring and enriching day!

Sobia Bilal, BDS, MSc, PhD, and Mateusz S. Wietecha, DMD, PhD
Co-Chairs, Scientific Committee
2025 C&R Day

Awards

AADOCR/Dentsply Sirona Student Competition for Advancing Dental Research and its Application (SCADA)

One student (dental student, dual doctoral student, or PhD student at the UIC College of Dentistry), who has at least one year of program remaining, will be chosen to represent the College in the 2025 American Association for Dental, Oral, and Craniofacial Research/Dentsply Sirona SCADA Program at the American Association for Dental, Oral, and Craniofacial Research (AADOCR) Annual Session in March 2026 in San Diego, CA.

Hinman Student Research Symposium

One student will be chosen to represent the UIC College of Dentistry at the Hinman Student Research Symposium sponsored by the University of Tennessee Health Science Center in Memphis at the Peabody Hotel, Fall 2025.

The Illinois State Dental Society Foundation Award

The premier dental student will be chosen by a panel of Illinois State Dental Association Foundation dentists in basic sciences, clinical sciences, and population/public health sciences, to receive an Illinois State Dental Society Foundation Award. The Foundation is the society's philanthropic wing; it provides scholarship money to qualified students, encourages and promotes student research, and sponsors continuing education for dentists throughout the State of Illinois.

Omicron Kappa Upsilon Awards

In 2025, the Sigma Chapter of Omicron Kappa Upsilon, the National Dental Honor Society, will provide awards to three dental students for Superior Achievement, Outstanding Achievement, and Achievement in abstract writing and presentation in educational research.

UIC College of Dentistry Awards

The UIC College of Dentistry will present awards of recognition to deserving undergraduate students, dental students, residents, graduate students, and post-docs/research staff across the following scientific categories: Basic/Basic Translational Sciences (BTS), Clinical/Clinical Translational Sciences (CTS), Educational Research (EdR), Population/Public Health Sciences (PHS), Case Reports (CaseR), and Literature Reviews (LitR).

Dr. Christine Da-Ruh Dental Student Research Scholarship

New for 2025, Dr. Christine D. Wu, professor, pediatric dentistry, has established a fund that will support scholarships for dental students in the College of Dentistry who demonstrate excellence in research. Funding may also be used for travel to attend or present research at professional conferences.

Dental Student Research Group Peer Award

The Dental Student Research Group (DSRG) is a student-led initiative dedicated to fostering a vibrant research community within the dental school. The DSRG's goal is to connect fellow students with research opportunities that align with their academic and professional interests. The DSRG provides guidance and support at every stage of the research process—whether you're starting a new project, refining a poster, or preparing a paper for publication. The DSRG team is here to help you succeed and excel in your research endeavors. The DSRG looks looks forward to collaborating with you!

At each Clinic and Research Day, the DSRG presents the "Peer Award" to students—from undergraduates to residents—who demonstrate excellence with the best scientific poster. Posters are evaluated by student researchers based on the clarity of content, quality of research, and effective communication of key findings. In recognition of their achievement, recipients are proudly awarded unique, 3D-printed trophies, a distinctive symbol of their outstanding contributions.

Research Awards Selected Prior to the 2025 C&R Day

This year's Dr. Isaac Schour Memorial Dentistry Student Research Award recipient is Mohammed Aref. The award stimulates student interest in research, giving students an opportunity to work creatively, develop excellence, and be inspired by the researchers with whom they work. We thank Dr. Seymour Gottlieb, '58, whose generosity funds the Schour Award.

Recognition and Thanks

The UIC College of Dentistry community wishes to give special recognition to those who have made the 2025 Clinic and Research Day possible.

GOLD

DHILLON DIGITAL SOLUTIONS LLC is a 100% digital premier dental lab for full arch fixed prosthetics and implant based fixed restorations. Founded in 2021, the company has focused on integration of digital technologies in dental clinics across the country with customized workflows that significantly reduce the lab cost, faster turnaround times with most accurate results leading to long term success in patient care. Located in Downers Grove, Illinois, Dhillon Digital Solutions has delivered over 4,000+ Full arch fixed cases nationwide with zero failures.

(847) 532-5252, www.dhillondigital.com

ENVISTA. The innovative companies that are part of Envista help dental professionals deliver the best possible patient care every step of the way. We know that dental professionals do more than create healthy, beautiful smiles—they create confidence. To achieve their goals, they need a champion. Envista is uniquely positioned to be this champion.

https://envistaco.com/en

WOLF OF ARCHES specializes in driving patient engagement through rapid response and personalized care. The company's services are designed to ensure your clinic's calendar stays full with seamless lead management and real-time communication. From immediate lead responses to 24/7 appointment scheduling, Wolf of Arches ensures no opportunity is missed. The company's team swiftly contacts potential patients the moment they inquire, guaranteeing a prompt booking before they can look elsewhere. Additionally, Wolf of Arches' lead tracking and reporting provide insights into every patient interaction from inquiry to surgery. Wolf of Arches takes pride in delivering a personal touch—no voicemail or automation—just real people answering calls and fostering meaningful connections. With customized agent training tailored to your clinic's needs, Wolf of Arches ensures your brand's voice is heard with every call. The company's dedicated team works in focused environments, delivering consistent, high-quality service while adapting to your evolving needs. Partner with Wolf of Arches for professional, responsive, and growth-oriented support for your clinic.

www.wolfofarches.com, info@wolfofarches.com, (224) 474-7904

SILVER

GC AMERICA INC. is a leading private manufacturer of professional consumable dental care products and one of the fastest growing dental companies in the world. Founded in 1992, GC America is the wholly owned U.S. subsidiary of GC Corporation, the world's fourth-largest professional dental consumables manufacturer in the world. Global headquarters is in in Lucerne, Switzerland, and the company was founded in Tokyo, Japan in 1921.

www.gc.dental/america/, Mark.Heiss@gc.dental

BRONZE

BISCO strives to inspire better dentistry worldwide by developing best-in-class dental products, educating and sharing knowledge and research with the dental community, and supporting customers' needs as their go-to restorative dental experts. Established in 1981, BISCO is located northwest of Chicago in Schaumburg, Illinois, providing industry leading materials to dental customers in the U.S. and in over 90 countries worldwide.

www.bisco.com

BRASSELER USA is a leading ISO Certified healthcare company, providing quality instrumentation to healthcare professionals for use in restorative dentistry, endodontics, oral surgery, and oral hygiene. For a half-century, Brasseler USA has developed a reputation as an innovative market leader in diamonds, carbides, polishers, endodontics, hand instruments, and handpieces. Today, Brasseler USA offers one of the most comprehensive assortments of instrumentation available under one brand.

1 (800) 841-4522, BrasselerUSADental.com

DENTSPLY SIRONA is the world's largest manufacturer of professional dental products and technologies. The company has a comprehensive end-to-end solutions offering of dental and oral health products. This offering includes some of the best-known and established brands in the industry. The company develops, manufactures and markets general dental supplies, CAD/CAM restoration systems (CEREC and inLab), a full suite of dental restorative products, imaging systems, instruments, treatment centers, hygiene systems, dental lasers and products supporting the dental specialty markets of orthodontics, endodontics and implants. In addition, the company has a global consumable healthcare products business.

Todd Gard, Todd.Gard@dentsplysirona.com.

LANG DENTAL MANUFACTURING'S Jet acrylics are used to fabricate self-curing tooth-colored acrylics, denture repair acrylics, and supporting equipment. Jet and Lang brand products are known for their durable and consistent performance and are trusted by clinicians and technicians worldwide.

Contact Jennie Dompke, jennifer@langdental.com, (847) 215-6622 for ordering and additional information.

HENRY SCHEIN® DENTAL

HENRY SCHEIN, INC. is a solutions company for healthcare professionals powered by a network of people and technology. With approximately 24,000 Team Schein Members worldwide, the company's network of trusted advisors provides more than 1 million customers globally with more than 300 valued solutions that help improve operational success and clinical outcomes. Henry Schein, Inc.'s business, clinical, technology, and supply chain solutions help office-based dental and medical practitioners work more efficiently so they can provide quality care more effectively. Thes solutions also support dental laboratories, government, and institutional healthcare clinics, as well as other alternate care sites.

www.henryschein.com/; Schein student dentist website, www.studentdentist.com

Clinic and Research Day Steering Committee
Ana Bedran-Russo (Lead), Alexandria Bell, William S. Bike, Sobia Bilal, Kristelle Capistrano, Darryl Langston, Chris Menden, Elsa Mejia, Amsaveni Ramachandran, Evan Smallwood, Cassandra Villani, and Mateusz S. Wietecha.

Scientific Committee
Co-chairs: Sobia Bilal, Mateusz S. Wietecha

Basic Sciences Subcommittee
Co-leads: Miya Kang, Phimon Atsawasuwan

Clinical Sciences Subcommittee
Lead: Camila Zamperini
Members: Russell Pesavento, Qian Xie

Educational Research Subcommittee
Lead: Alison Doubleday
Members: Robert Bara, Asha Eapen, Aniruddh Narvekar, Betti Shahin

Population Health Sciences Subcommittee
Lead: Bhati Desai
Members: Laila Iqbal, Khatija Noorullah, Rebecca Van Horn

Case Reports Subcommittee
Lead: Evelina Kratunova
Members: Majd Alsaleh, Georgia Lymberopoulos, Lisa Rawle

Literature Reviews Subcommittee
Lead: Jennifer Bereckis Jacobucci

Critically-Appraised Topics Subcommittee
Lead: Silvia Villalobos Sancho
Member: Flavia Lakschevitz

Keynote Speaker

Jennifer Webster-Cyriaque

Jennifer Webster-Cyriaque, DDS, PHD, is presently the acting director of the National Institute of Dental and Craniofacial Research, National Institutes of Health. An accomplished clinician, researcher, and leader, Dr. Webster-Cyriaque had previously served as a faculty member at the University of North Carolina (UNC) schools of dentistry and medicine for more than two decades.

As a tenured full professor at UNC, Dr. Webster-Cyriaque also served as the attending on clinical service at the UNC Hospital's dental clinic. While there, she led research into a potential etiologic agent for salivary gland disease in patients living with HIV, assessed the oral microbiome and its implications for cancer-causing viruses, and studied the impact of the oral microbiome and oral health on HIV outcomes.

In addition to her research, Dr. Webster-Cyriaque has held leadership roles as the chair/vice chair of the Oral HIV/AIDS Research Alliance, as research director at the National Dental Association Foundation, as director of postdoctoral CTSA training, along with multiple roles within the American Association for Dental, Oral, and Craniofacial Research and the International Association for Dental Research. Since 2004, she has led the UNC Malawi project and aided in founding Malawi's first dental school in 2019.

Dr. Webster-Cyriaque earned her PhD in microbiology/immunology from the University of North Carolina-Chapel Hill in 1998, her DDS from SUNY Buffalo in 1992, and her BA in biology and interdisciplinary

Registered Judges

Dr. Orlando Abreu
Dr. Guy Adami
Dr. Zabihulla Ahmadi
Dr. Sahar Alrayyes
Dr. Seema Ashrafi
Dr. David M. Avenetti
Dr. Velavan Bakthavachalam
Dr. Robert M. Bara
Dr. Blase P. Brown
Dr. James Henry Bryniarski
Dr. Wendy Cerny
Dr. Lin Chen
Dr. Yinghua Chen
Dr. Peter D'Aloia
Dr. Robert Deaver
Dr. Renata Rizental Delgado
Dr. Luisa A. DiPietro
Dr. Alison F. Doubleday
Dr. Asha Eapen
Dr. Shlomo Elbahary
Dr. Kassapa Ellepola
Dr. Mohammed Elnagar
Dr. Shar Fadavi
Dr. Praveen Gajendrareddy
Dr. Amudha Ganapathy
Dr. Feng Gao
Dr. Mary Claire Garcia
Dr. Anne George
Dr. Sujoy P Ghosh
Dr. Joseph Gluck
Dr. Jimmy Gonzalez-Vicker
Dr. Colin Haley
Dr. Michael Han
Dr. Brittaney Hill
Dr. Gonzalo Izaguirre
Dr. Brad Johnson
Dr. Miya Kang
Dr. Linda M Kaste
Dr. Nadia Kawar
Dr. Flavia Lakschevitz
Dr. David Maclin
Dr. Frank Allan Maggio
Dr. Luis Mezzomo
Dr. Steve Miller
Dr. Leda Mugayar
Dr. Raza Ali Naqvi
Mrs. Daisy Patino Nguyen
Dr. Christina Nicholas
Dr. Chandrashekhar Patil
Dr. Philip Patston
Dr. Russell P. Pesavento
Dr. Gloria Pimenta Cabral
Dr. David A. Reed
Dr. Mariana Reis-Havlat
Dr. Susan Rowan
Dr. Alex Sarpong
Dr. Michael L Schmerman
Dr. Adriana C. Semprum-Clavier
Dr. Betti Shahin
Dr. Marwa Shembesh
Dr. Sreelekshni Sree kumar
Dr. Walter B. Stanford
Dr. Swee Tan
Dr. Lin Tao
Dr. Scott L Tomar
Dr. Melek Didem Tozum
Dr. Sadiq Umar
Dr. Araceli Maria Valverde
Dr. Grace Viana
Dr. Jianchun Wu
Dr. Qian Xie
Dr. Susan K. Zelazo-Smith
Dr. Xiaofeng Zhou

History of Clinic and Research Day

In 1988, the University of Illinois Chicago College of Dentistry began its student-based Clinic Day, later to be renamed Clinic & Research Day, providing a forum for students to showcase their cutting-edge research projects and for students, alumni, and faculty to receive educational and professional enrichment information from a keynote speaker. The first Clinic Day, held April 6, 1988, was proposed and organized by students. Its success and the growth of the event prompted faculty and administration to make it an official annual activity at the College.

In 1996, the modern Clinic & Research Day was initiated through a formal gathering of faculty and interested students, to re-invigorate the existing student-based Clinic Day. It provided an opportunity for students and faculty to interact in advancing oral healthcare and research while embracing the entire local community. Clinic & Research Day has grown into an incredibly diverse and rich gathering that reflects on all of the clinical and research activities going on at the College.

Clinic & Research Day in the past included comedic "game show" quizzes, dexterity challenges such as wax tooth carving, table clinics, technology demonstrations, and tours of the College. While some of these offerings have been eliminated, the event has become more focused and fine-tuned and is similar to a national dental meeting with oral and poster presentations on clinical and research subjects, dental products vendors and service providers' exhibits, a keynote speaker, and awards for excellence.

For many years, Department Heads were in charge of the faculty component of Clinic & Research Day, but since the creation of the College's Office of Research Services in 2003, the Associate Dean for Research, currently Dr. Ana Bedran-Russo, has overseen the Clinic and Research Day Committee. Dr. Bedran-Russo also is this year's lead. Throughout Clinic and Research Day's history, however—it's the students' day. With every Clinic & Research Day, the College builds on the experience, expands the event, and displays the increases in the diversity of research along with the diversity of the COD community.

This year's event for the first time is being held outside the College of Dentistry building at the University's Student Center West, further integrating it with the greater UIC community.

BASIC SCIENCES

1. TRANSPORT OF MATURE MIRNA INTO MESENCHYMAL STEM CELL EXTRACELLULAR VESICLES

Niloufar Abedi, Chun-Chieh Huang, Yu Lu, Sadiq Umar, Sriram Ravindran
Department of Oral Biology, UIC College of Dentistry

Objectives: Mesenchymal stem cell extracellular vesicles (MSC EVs) have emerged as critical paracrine mediators of cellular function and serve as an alternative to stem cell therapy in regenerative medicine applications. MSC EV resident miRNAs significantly contribute towards EV function. EV resident miRNAs are selectively transported into EVs via RNA-binding shuttle proteins. While multiple proteins have been shown to possess this function in various mammalian cells, the proteins involved in miRNA transport into MSC EVs remain unclear. Our objectives are to: 1) Determine what shuttle proteins are highly expressed in MSCs. 2) Identify which proteins are effective in MSC EV miRNA transport. 3) Identify the best tag/s (recognition sequences for shuttle proteins) to effectively transport therapeutic miRNAs into MSC EVs.
Methods: miR148a-3p, a salivary EV miRNA with wound healing functions, was chosen as a candidate for designing experiments due to its low expression in MSCs and MSC EVs as well as its prominent expression in salivary EVs. qRTPCR screened multiple shuttle proteins in MSCs; three highly expressed ones were identified. We custom-modified a miRNA expression vector to express miR148a-3p with/without sorting tags in MSCs for these highly expressed proteins. We cloned the pre-miRNA148a sequences into this vector with different tags at the 3p strand and the control group without a tag. We then generated a lentivirus with these vectors and transfected MSCs, followed by selection for stable expression and qRTPCR to verify miRNA expression. Also, qRTPCR and western blot at the cellular level were applied to confirm that the expression of 3 highly expressed proteins is the same among all cell lines.
Results: Three highly expressed shuttle proteins in MSCs were RNPA2B1, ANAX2, and YBX. miR-148a-3p expression in the MSCs EVs with YBX tag (ACCAGCCU) showed a greater than a 3-fold increase compared to other tag groups and control. miRNA overexpression in the presence or absence of the tags did not affect the gene or protein expression of the shuttle proteins indicating that increased EV miRNA presence with the YBX tag is due to activity of the shuttle protein.
Conclusions: Identifying MSC-specific shuttle proteins for EV miRNA transport opens up an interesting avenue for miRNA-based EV engineering, which applies to the treatment of multiple organ systems and disorders. Future studies will focus on identifying the tag combination/s to effectively transport mature miRNAs into MSC EVs.
Approval: N/A
Funding: NIH R01 DE027404, NIH R01 DE030495

2. NG2/CSPG4 REGULATES BONE MICROARCHITECTURE AND OSTEOCHONDRAL DIFFERENTIATION DURING TMJ PTOA

Dakshina Acharya, Jonathan Banks, David Reed
Department of Oral Biology, UIC College of Dentistry

Objectives: Dysfunction of the temporomandibular joint (TMJ) is a common craniofacial musculoskeletal disorder that is linked to pain, limited mobility, facial asymmetry, malocclusion, growth issues, ankylosis, and reduced quality of life. During TMJ post-traumatic osteoarthritis (PTOA), subchondral bone remodeling plays an active role in pathophysiology, regulating matrix turnover and osteoclast activation. NG2/CSPG4 is a transmembrane proteoglycan that regulates TMJ PTOA allostasis and has been implicated in endochondral ossification in the appendicular skeleton. There is a gap in knowledge related to if NG2/CSPG4 influences subchondral remodeling during TMJ PTOA and the molecular mechanism controlling osteochondral differentiation in mandibular fibrochondrocytes. The objective of this study is to define the role of NG2/CSPG4 in subchondral bone formation and remodeling in the TMJ.
Methods: To characterize PTOA-induced changes in subchondral bone in vivo, PTOA was induced in skeletally mature 16-week old male and female, control (c57 BL6/J) and NG2/CSPG4 knockout mice through unilateral partial discectomy. Tissues were collected 4- and 8-weeks after PTOA induction along with non-surgical controls, fixed overnight in 4% paraformaldehyde, and μCT scanned at 70 kV at a resolution of 12 μm voxel size. A region of interest (ROI) was contoured that included bone superior to a plane through the medial and lateral condylar poles. The ROI was analyzed using the Trabecular Analysis package (Scanco Medical). To investigate the mechanism of osteochondral differentiation in vitro, primary mandibular fibrochondrocytes (pMFCs) from 10–14-day-old control and NG2ko mice were cultured up to 4 passages with and without osteogenic differentiation media (ODM) for 7-days, RNA was isolated and analyzed using bulk RNA sequencing and RT-qPCR. Means were compared using a one-way ANOVA with post-hoc Tukey corrections ($\alpha = 0.05$).
Results: The μCT analysis illustrates NG2/CSPG4 significantly increases trabecular thickness, trabecular spacing, and total mineral density and significantly decreases trabecular number in both non-surgical control and OA samples ($p < 0.01$; n=5). Bulk-RNAseq analysis illustrates that NG2ko pMFCs are associated with a significant change in the "ossification" gene enrichment set (factor 0.1; $p < 8e\text{-}06$; n = 4/genotype). Culturing with osteogenic differentiation media resulted in significant NG2-dependent increases in BMP2 and the BMP antagonist Grem1($p < 0.05$; n=4), with ODM-dependent suppression of Grem1 in NG2ko cells only (ns; n=4). An ODM-dependent increase in TGFβ was also found in NG2ko cells only ($p < 0.001$; n=4).
Conclusions: These findings demonstrate that NG2/CSPG4 is implicated in the transcriptional regulation of osteochondral differentiation in the mandibular condylar cartilage, affecting the dentistry and organization of the subchondral bone.
Approval: ACC Protocol Number 23-042
Funding: NIH R01 DE02983

3. NANO-AGGREGATE TARGETS STREPTOCOCCUS MUTANS LEADING TO CROSS-KINGDOM ASSEMBLAGE REDUCTION

Mohamad K. Alhadlaq, Kassapa Jayo Bandara Ellepola, Russell Pesavento
Department of Oral Biology, UIC College of Dentistry

Objectives: Our previous work suggests a nano-aggregate formulation prepared in our laboratory selectively clears Streptococcus mutans from whole human saliva (WHS). Herein, we aim to evaluate the efficacy, selectivity, and mechanism of this interaction leading to biofilm reduction in a chemically defined medium in both single and multispecies models comprising Candida albicans, a key contributor to both early childhood caries (ECC) and root caries in older adults. This study will allow us to assess the suitability of mucin-containing medium (MCM) as an alternative to WHS for single and multi-species biofilm studies of this nature. Since a co-aggregation (or microbial assembly) between S. mutans and C. albicans has been reported in WHS but not in MCM, to the best of our knowledge, this study represents an opportunity to further validate its use.
Methods: Chondroitin sulfate A (CSA) was added to a cerium oxide nanoparticles (CeO2-NP, 3-5 nm) dispersion in acidic media to produce CeO2-NP-CSA-B aggregates similar to the literature methods. MCM was prepared following literature methods. To evaluate the suitability of MCM as an appropriate media for mechanistic studies, the sedimentation and antibiofilm activity of CeO2-NP-CSA-B was compared against S . mutans and C. albicans. Static, sucrose-based biofilm inhibition assays were carried out on polystyrene plates. CeO2-NP-CSA-B was tested against single and multi-species biofilms in MCM. Literature-based colony-forming unit (CFU) methods and crystal violet (CV) staining were used to quantify adherent biofilms.
Results: Compared to the clearance efficacy and selectivity in WHS from previous studies, CeO2-NP-CSA-B behaved similarly in MCM against single and dual-species, measured via sedimentation and biofilm attachment assays. A significant reduction in the biofilm of S. mutans and the multi-species biofilm(>50% reduction) was seen in the groups treated with CeO2-NP-CSA-B. However, a reduction of C. albicans with CeO2-NP-CSA-B was only significant in the treated multi-species biofilms, not in the single-species assay with C. albicans.
Conclusions: MCM is a suitable alternative to WHS for studying the properties of CeO2-NP-CSA-B in mixed S. mutans -C. albicans models. Multi-species biofilm reduction by CeO2-NP-CSA-B is attributed to the i) selective clearance of S. mutans and ii) the co-assembly of S. mutans with C. albicans. Additional studies are necessary to confirm the co-assemblage in MCM.
Approval: IRB Protocol Number 2022-0927
Funding: N/A

4. SINGLE-CELL RNA-SEQ ANALYSIS OF STROMAL CELL DYNAMICS IN A MOUSE MODEL OF WOUND HEALING

Mohammad Aref, Mateusz S. Wietecha
Department of Oral Biology, UIC College of Dentistry

Objectives: Wound healing is a highly optimized and complex biological process involving the coordination of multiple cell types across three successive healing phases: inflammation, proliferation, remodeling. During wound healing, stromal cell types such as fibroblasts, macrophages and endothelial cells have known distinct functions, but their shared contributions to the restoration of tissue integrity and homeostasis is largely unknown. The purpose of this study was to explore gene expression patterns in fibroblasts, macrophages, and endothelial cells during wound healing using single-cell RNA sequencing approaches. The main objective was to identify cell-specific and non-specific signaling pathways that contribute to tissue repair, with an emphasis on the remodeling phase.
Methods: Single-cell RNA sequencing and bioinformatics was used to re-analyze a dataset of skin samples collected from wounded mice at four time points encompassing all phases of healing: days 1, 3, 7, and 14 post-injury (GSE204777). Data processing and differential gene expression analysis were performed in R Studio using R (4.4.1) and the Seurat package (5.1.0). Filtering techniques in Microsoft Excel and the online Venny 2.0 tool simplified the identification of cell-specific and shared genes. EnrichR was used to conduct pathway enrichment analysis, focusing on genes active during the remodeling phase.
Results: The analysis identified fibroblasts, macrophages, and endothelial cells as central to the wound healing process with similar temporal dynamics. Variations in gene expression were observed across all healing phases in all three cell types, with the most pronounced upregulation of genes occurring during remodeling. Among the differentially expressed genes, 34 were found to be common across these cell types during the remodeling phase, primarily linked to the Eukaryotic Translation Elongation pathway (R-HSA-156842).
Conclusions: The discovery of 34 shared genes in three distinct stromal cell types stresses their crucial role in the wound healing process, particularly in promoting protein synthesis necessary for tissue reconstruction. These insights advance our understanding of the molecular mechanisms underlying wound healing and highlight potential targets for therapeutic interventions aimed at improving tissue regeneration.
Approval: N/A
Funding: UIC College of Dentistry Summer Research Program

5. NG2/CSPG4 MODULATES THE BIOMINERALIZATION OF MANDIBULAR FRACTURE HEALING

Jonathan Matthew Banks, Dakshina Acharya, Mateusz S. Wietecha, Anne George, David Reed
Department of Oral Biology, UIC College of Dentistry

Objectives: Trauma-induced mandibular fractures result in limited mobility and reduced quality of life, yet their prevalence increases annually. These unstable fractures heal via endochondral ossification, with osteoprogenitors undergoing differentiation into chondrocytes and osteoblasts. Neuron-glial antigen 2 (NG2/CSPG4) is a type VI collagen receptor and transmembrane proteoglycan that regulates the mechanobiological and injury response of the mandibular cartilage in the temporomandibular joint. There is a gap in knowledge related to how NG2/CSPG4 transcriptionally regulates the differentiation of chondrocytes into osteoblasts during endochondral ossification in mandibular fracture healing. The objective of this study is to determine if NG2/CSPG4-mediated signaling modulates osteochondral differentiation and bone quality during mandibular fracture healing.
Methods: To induce unstable mandibular fractures, surgical osteotomies on the mandibular condylar neck were conducted in skeletally mature C57BL/6J wild-type (WT) and NG2/CSPG4 knockout (NG2ko) male and female mice. Fracture calluses were collected 0-, 7-, and 21-days post-osteotomy. Fracture healing quality was analyzed with trabecular bone analysis from μCT scans of 7- and 21-day groups. Cartilaginous calluses from 7-days post-osteotomy samples were harvested and processed using 10X Genomics Chromium Single-Cell 3' protocols. Sequencing outputs were normalized, clustered, and analyzed with downstream gene-enrichment analysis.
Results: In NG2ko male and female mice, μCT analysis revealed significant changes in bone properties, including reduced bone density, trabecular density, bone volume, and trabecular thickness ($p<0.05$,$n=9$/ 21-day group). Single-cell RNA sequencing and downstream analysis of samples from NG2ko and WT fracture calluses yielded 6 clusters, with 2 clusters identified as potential chondrocyte or osteoblast cells. One of these clusters was defined by significant changes in NG2/CSPG4 expression and contained only 3.7% of the NG2ko cells.
Conclusions: These findings illustrate that NG2/CSPG4 significantly regulates chondrocytes and osteoblast cell phenotypes, that the loss of NG2/CSPG4 alters the transcriptional profile of this cell type, and that NG2/CSPG4 knockout mice have impaired fracture healing potential.
Approval: ACC Protocol Number 24-050
Funding: NIH F30 DE033287, NIH R01 DE029835

6. CONDYLAR AND FOSSA SHAPE COVARIATION IN POST-TRAUMATIC TMJ OSTEOARTHRITIS MODEL

Stephon Lashawn Carr, Christina Nicholas
Department of Oral Biology, UIC College of Dentistry

Objectives: Osteoarthritis (OA) of the temporomandibular joint (TMJ) leads to structural changes that disrupt joint function and contribute to TMJ dysfunction. This study aims to analyze morphological variations in the TMJ condyle and fossa

in healthy and OA-affected mice using morphometric techniques. Findings will contribute to understanding the pathophysiology of TMJ OA and inform strategies for early diagnosis and intervention.
Methods: This study employed geometric morphometric and statistical analyses to assess TMJ shape differences between healthy and OA-affected mice. 3D coordinate landmarks were placed on the condylar head and fossa using 3D Slicer, enabling precise capture of joint morphology. Geometric morphometric data were analyzed using Partial Least Squares (PLS) to examine the relationship between condyle and fossa shapes. Principal Component Analysis (PCA) was used to summarize fossa shape variation, yielding 17 principal components (PCs), with the first three accounting for over 5% of total variation.
Results: 2B-PLS revealed a pattern of covariation (r-PLS=0.812) that was approaching significance (p=0.068). As condylar head shape flattens, as is typically seen in the mice with PTOA, the mandibular fossa becomes antero-posteriorly elongated and the apex of concavity shifts laterally towards the zygoma. A generalized Procrustes analysis and principal components analysis of the fossa shape alone yielded 17 principal components, the first 5 of which represented >5% of the total variation. Of these, only PC3 differed by case/control status (p=0.001). Along PC3, mice with PTOA have fossae that are antero-posteriorly wider towards the zygoma and which are supero-inferiorly taller, especially laterally.
Conclusions: Removal of the TMJ disc has been hypothesized to generate flattening of the condylar head to equilibrate stresses either through increased direct contact or through lateralization of the condyle during mastication. Our results appear to support the latter hypothesis, and they have the potential to influence current understandings of PTOA pathophysiology, leading to novel treatment approaches for TMJ disorders.
Approval: N/A
Funding: N/A

7. BIOCOMPATIBILITY OF TITANIUM SURFACE COATED WITH ZRO2-TIO2 THROUGH ATOMIC LAYER DEPOSITION

Jennifer Chang, Bin Yang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Titanium (V) discs coated with ZrO2, ZrO2-TiO2 nanofilm are biocompatible and have increased gene expression than those in control. Titanium (V) discs coated with ZrO2, ZrO2-TiO2 nanofilm have increased adherent epithelial cell density than control.
Methods: Titanium grade V disks were polished using grit sandpaper to average Ra (roughness) within 3um. Control, ZrO2 and ZrO2-TiO2 nanoceramic thin film of 30-50nm thickness were deposited through ALD. Epithelial HAT7 cells were cultivated with disc in DMEM medium. Coding cRNA was separated from live cells, quantified, converted to DNA, and real-time quantitative PCR was completed for selected genes from protein databank with bioinformatics. Cellular attachments were analyzed with

live/dead cells in SEM.
Results: Dental epithelial cells were viable on in all groups, with the 1:4 ZrO2-TiO2 group demonstrating increased number of attached cells with attachment processes at the cell-disk interface at both 24 and 48 hours. Laminin and Integrin expression levels were not different amongst groups and were trending towards increased expression in the 1:4 ZrO2-TiO2 group across all time points. Initial cell adhesion as measured by total amount of dsDNA at 1, 3, 6, and 24 hours were not different amongst groups. Genes known to participate in cellular attachment such as Collagen IV, Collagen VI, Versican, Laminin, Periostin, Thrombospondin, integrin, Vinculin were examined. For all examined genes, 48 hours showed more mRNA expression compared to 24 hrs for both mixed and ZrO2 coated groups.
Conclusions: Epithelial cells are biocompatible and viable in tested Atomic Layer Deposition deposited nanoceramic conditions of ZrO2-TiO2 and actively forming attachment to titanium in vitro. Nanoceramic coating of ZrO2 and ZrO2-T is a promising method to improve the bio-functionality of titania alloy V as implant abutment material.
Approval: N/A
Funding: N/A

8. TEMPERATURE-INDUCED INJURY RESPONSES DIFFER IN ORAL AND SKIN KERATINOCYTES

Amy K. Chen, Chen Han, Heidi Yuan, Luisa A. DiPietro, Lin Chen
Center for Wound Healing and Tissue Regeneration, UIC College of Dentistry

Objectives: The epidermis of skin and oral mucosa is constantly exposed to various environmental stimuli, including temperature. Under extreme conditions, such as excess heat or cold, significant injury may occur. Keratinocytes are the major cellular component of the epidermis of skin and oral mucosa. Whether skin and oral keratinocytes respond differently to temperature-induced injury is unknown. The aim of this study was to investigate the cellular and transcriptomic responses of skin and oral keratinocytes after heat or cold injury.
Methods: Human skin keratinocytes (HaCaT) and human gingival keratinocytes (TIGK) were exposed to heat or cold injury conditions: 60°C for 10 and 20 minutes or -25°C for 10, 20, and 60 minutes. Afterwards, cell morphology and viability were examined. HaCaT and TIGK cell death was also assessed with an Annexin V Apoptosis Detection Kit APC. HaCaT and TIGK cultured at 37°C served as the baseline control temperature. HaCaT and TIGK cultured in media supplemented with 10% dimethyl sulfoxide served as an additional control for cold injury conditions. RNA-sequencing was performed on HaCaT and TIGK exposed to 60°C or -25°C for 10 minutes or on HaCaT and TIGK cultured at 37°C. Enrichment analysis for gene ontology (GO) biological processes (BP), molecular function (MF), and reactome terms was performed. Differentially expressed heat shock proteins (HSPs) were also identified and compared between HaCaT and TIGK at baseline and after heat or cold injury.

Results: Both heat and cold injury conditions resulted in significant cell death for HaCaT and TIGK. However, compared to HaCaT, TIGK exhibited significantly higher viability after heat injury. There were no differences between HaCaT and TIGK viability after cold injury. HaCaT and TIGK cells maintained their morphology following heat injury. After cold injury, TIGK, but not HaCaT, became smaller. Furthermore, our RNA-sequencing revealed many differentially expressed genes between HaCaT and TIGK at baseline and after heat or cold injury. Compared to HaCaT, TIGK exhibited many fewer differentially upregulated HSPs following heat or cold injury. Many of the HSPs differentially upregulated in HaCaT following heat or cold injury were already upregulated at baseline in TIGK relative to HaCaT.
Conclusions: Heat and cold injury induce significant transcriptomic changes in both skin and oral keratinocytes. Although TIGK showed a less robust response in HSP activation following heat injury when compared to HaCaT, TIGK were still more resistant to heat injury. This may be due to TIGK having a more advantageous gene expression of HSPs at baseline relative to HaCaT. Overall, our work provides an analysis of the molecular mechanisms that might underlie the responses of skin and oral keratinocytes to heat and cold injury.
Approval: N/A
Funding: NIH R01 GM050875, NIH R35 GM139603, NIH F31 DE028747, NIH F31 AR082287

9. ROLE OF BDNF/TRKB IN TNFA-INDUCED ODONTOBLASTIC DPSC DIFFERENTIATION

Kerwin Chong, Muhamad Irfan, Ji Hyun Kim, Seung Chung
Department of Oral Biology, UIC College of Dentistry

Objectives: Dental caries is the most common tooth disease worldwide that is caused by multiplex interaction of bacteria. Reparative dentinogenesis is accompanied by intense inflammation that initiates stem/progenitor cell recruitment by odontoblast-like cells. The majority of the attention has been given to direct dentinogenesis, while few studies have explored the role of inflammation in this process. Brain□derived neurotrophic factor (BDNF) is a nerve growth factor-related gene family molecule which functions through tropomyosin receptor kinase B (TrkB). While the roles of BDNF in neural repair and other regeneration processes are well-identified, its role in dentinogenesis has not been explored. Furthermore, the role of BDNF receptor-TrkB in inflammation-induced dentinogenesis remains unknown. The aim of this study is to determine the role of BDNF/TrkB in TNFα -induced dental pulp stem cells (DPSC) odontoblastic differentiation.
Methods: The role of BDNF/TrkB was examined during the 17-day odontogenic DPSC differentiation. Human DPSCs were subjected to odontogenic differentiation in osteogenic media treated with the TNFα, BDNF and TrkB agonist.
Results: Immunofluorescent data confirmed the expression of BDNF and TrkB on

day 4 differentiation. Our ELISA and qPCR data demonstrated that TrkB agonist (LM22A-4) treatment increased the dentin matrix protein-1 (DMP-1) expression during early DPSC odontoblastic differentiation. Consistent with this, the expression of other osteogenic markers such as runt-related transcription factor 2 and osteocalcin is increased. Odontoblastic differentiation of DPSCs associated with caries injury undergoes in an inflammatory context. TNFα, which is responsible for a diverse range of inflammation signaling, increased the dentin sialophosphoprotein (DSPP) and DMP1 expression. Furthermore, BDNF significantly potentiated its effect. Application of both TNFα and TrkB antagonist (CTX-B) showed a decreased expression of DSPP and DMP1 compared to TNFα and BDNF treatment.
Conclusions: These data suggest that BDNF and TrkB activation increase TNFα-stimulated DPSC odontoblastic differentiation. Our study addresses a novel regulatory pathway and a therapeutic approach in DPSC engineering in dentinogenesis.
Approval: N/A
Funding: NIH R01 DE029816

10. SALIVA STORAGE FOR DIAGNOSTICS: INFLUENCE OF ADDITIVES ON ELECTROCHEMICAL PARAMETERS

Karam Fattouhi, Sujoy Ghosh, Mohamad K. Alhadlaq, Kassapa Jay Bandara Ellepola, Russell Pesavento, Mathew T. Mathew
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral Biology, UIC College of Dentistry

Objectives: Biofluids are a viable option to sense periodontal and systemic diseases, using abnormalities to predict and diagnose conditions like diabetes. Biosensing for patient diagnosis would allow non-invasive testing to be utilized more than invasive methods such as drawing blood. The challenge is collecting saliva, as the saliva may contain food particles obstructing the biosensing. However, the greatest challenge with diagnostic saliva testing is preserving the proteins and RNA found in the saliva. This study employs protein stabilizers that preserve the proteins and RNA in the saliva. The aims of this study are to determine the electrochemical kinetics variations as a function of protein inhibitors and ribonuclease stabilizers and to evaluate the synergistic electrochemical effects of adding the stabilizers together. Adding stabilizers will not denature the proteins and RNA, allowing us to analyze contents present in the saliva while also maintaining the properties of the saliva using electrochemical analysis.
Methods: Using the stabilizers, the study will be able to analyze the electric flow passing through the saliva while the proteins inside are still intact. Protein stabilizers and ribonuclease inhibitors will isolate and purify the RNA and proteins in the saliva sample. In this experiment, all participants received detailed information about experimental protocols through oral communication, as all saliva samples were voluntarily collected. Saliva samples were collected using passive drooling into 10 mL falcon tubes. Immediately after collection, the saliva samples were labeled and

centrifuged at 500 rpm for 5 minutes. Supernatant fluid was pipetted into a fresh Eppendorf tube and labeled. There were four experimental groups: 1. Control (no stabilizers) 2. Adding 5 µL of RNase inhibitor (Optizyme Ribonuclease Inhibitor) 3. Adding 10 µL of Protease inhibitor (Halt Protease Inhibitor Cocktail) 4. Adding together 5 µL of RNase inhibitor and 10 µL of Protease inhibitor. The saliva groups were pipetted onto a biosensor (Dropsens-250A) connected to a Gamry-made Potentiostat to study the electrochemical activity. Open circuit potential (OCP), electrochemical impedance spectroscopy (EIS), and cyclic voltammetry (CV) were analyzed.
Results: Based on the OCP graph, adding both inhibitors results in the most stable potential. When individual stabilizers were added to the sample, there was a decline in conductivity. The EIS Bode Plot showed that the samples with both stabilizers had the lowest impedance values compared to the other groups, indicating better conductivity. There was a significant increase in the CV total area when inhibitors were added individually.
Conclusions: The addition of both stabilizers to the saliva gives more stability for the saliva storage. Therefore, adding protein and RNA stabilizers preserves the electrochemical activities of saliva. The study has many limitations, so further studies are required.
Approval: IRB Protocol Number 2021-096
Funding: NIH R01 DE031832

11. VALIDATION STUDIES OF INTELLIGENT SALIVARY BIOSENSORS FOR STROKE RISK PREDICTION

Haritha George, Junyi Wu, Yan Yan, Xue-Jun Li, Amith Jacob, Russell Pesavento, Mathew T. Mathew
Department of Biomedical Engineering, University of Illinois Chicago,
Department of Computer Science, University of Illinois Chicago,
Department of Biomedical Science, University of Illinois Chicago,
OSF St Antony Medical Center, Rockford, IL,
Department of Oral Biology, UIC College of Dentistry
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Oral health as an indicator of systemic health is increasingly relevant, with diseases like periodontitis linked to systemic conditions such as stroke. According to the CDC, someone in the United States experiences a stroke every 40 seconds. Saliva contains molecules indicative of disease conditions, making salivary biomarkers an emerging field for early diagnosis. MMP9 (Matrix metalloproteinase-9), a Zn2+-dependent endopeptidase, is associated with disruption of the blood-brain barrier, increased risk of hemorrhagic complications, and worsened outcomes. This study aims to verify and validate the salivary stroke risk biomarker MMP9, alongside the antioxidant Glutathione (GSH), using an electrochemical biosensor and machine learning system.

Methods: To verify the developed biosensor and machine learning system, a stroke-like condition in the microglia HMC3 cell line was simulated with Lipopolysaccharide (LPS). The optimum concentration of LPS to be used is found by simulating stroke-like conditions using different concentrations of LPS in microglia cell lines. Using alarm blue, live dead, FITC/DAPI, and ROS assays different concentrations of LPS and time points were tested. That optimum LPS concentration was tested again in the presence of different concentrations of GSH to see the biological effects. The oxidative stress condition created by LPS and alleviated using GSH was checked. The cellular MMP9 changes with LPS and the addition of GSH was checked with ELISA. The spent media from these test conditions were used to check the MMP9 levels using the developed biosensor and the machine learning algorithm for biosensor verification. To validate the biosensor system, volunteer saliva samples were collected and tested for the MMP9 level.
Results: The antioxidant effect was checked and higher concentration of GSH reduced the MMP9 and the oxidative stress pathway proteins. The machine learning based biosensor testing gave good prediction of MMP9 concentration of the spent media of HMC3. The volunteer saliva samples when tested also gave a decent risk prediction with most of the samples predicted as normal.
Conclusions: Salivary MMP9 concentration levels during stroke risk conditions could be detected using electrochemical biosensors, making the testing for stroke risk non-invasive. Labor-intensive testing for biomarker levels and the associated risk for stroke could be assessed with the help of machine learning models. Clinical studies with a large number of patient samples could improve the model's performance accuracy. Early prediction of stroke risk will benefit patients and caregivers by improving quality of life and reducing healthcare and insurance burdens.
Approval: N/A
Funding: NIH R01 DE031832, The Blazer Foundation

12. CELL ACCELERATED CORROSION CAN BE ASSESSED USING ELECTROCHEMICAL BIOSENSOR

Sujoy P. Ghosh, Mostafa Alhamad, Pragnya Sai Priya Munisetti, Anne George, Yinghua Chen, Mathew T. Mathew
Department of Restorative Dentistry, UIC College of Dentistry, Department of Restorative Dental Sciences, College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, Department of Biomedical Engineering, UIC College of Engineering and Medicine, Department of Oral Biology, UIC College of Dentistry

Objectives: Corrosion at the modular junctions of dental implants remains a significant concern. Multiple types of damage modes have been identified at modular junctions, correlated with different corrosion characteristics that may eventually lead to implant failure. Among the primary challenges to dental implant treatment success is peri-implantitis, a condition increasingly linked to titanium (Ti) corrosion products and

undetected residual dental cement. Despite this, the impact of Ti corrosion remains poorly understood. This study aims to evaluate the electrochemical behavior of macrophages and fibroblasts in response to metal ion leaching caused by Ti corrosion. Specifically, it seeks to investigate whether Ti corrosion influences phagocytic activity and contributes to implant-related complications. The null hypothesis posits that Ti corrosion has no effect on phagocytic activity.
Methods: Both macrophages and fibroblasts were cultured separately. Macrophages and Fibroblasts were cultured under identical conditions to ensure a consistent experimental environment. The cells were exposed to five distinct media groups to assess their response. Groups used 1) control media(PBS solution) 2) spent media(PBS solution when dental implant was submerged 3) Ti Ions (PBS with implant and Ti Ions) 4) Ti partials(PBS with implant and Ti particles) 5) Ti Ions+ Particles (PBS with implant and Ti Ions + particles).Electrochemical analysis procedure: 100 µl was pipetted onto a biosensor (Dropsens-250A) connected to a Gamry-made Potentiostat to study the electrochemical activity of collected samples. Open circuit potential-(OCP), electrochemical impedance spectroscopy-(EIS), and cyclic voltammetry-(CV) were analyzed.
Results: Macrophages showed significant OCP and impedance variations, indicating immune responses to titanium ions and particles, with the combination having the strongest effect. Almost no changes seen with fibroblast with OCP. Macrophages demonstrated higher sensitivity, as evidenced by significant shifts in Nyquist and Bode plots, as well as changes in EIS modeling. Fibroblasts exhibited lesser sensitivity, as evidenced in Nyquist and Bode plots, and EIS modeling. Interestingly The combination of titanium ions and particles produced synergistic effects, amplifying electrochemical perturbations in both cell types. Increased cellular stress in macrophages, is reflected by changes in charge transfer resistance and capacitance. CV analysis further highlighted these differences, showing that macrophages had a much higher level of charge transfer and interaction with the media compared to fibroblasts.
Conclusions: This suggests that macrophages are more responsive to titanium ions and particles, while fibroblasts maintain a more stable electrochemical profile. This study demonstrates that macrophages and fibroblasts react differently to environmental changes. It is an ongoing study and requires further research.
Approval: N/A
Funding: N/A

13. NG2/CSPG4 REGULATES ALVEOLAR BONE MICROSTRUCTURE IN A SEX-DEPENDENT MANNER

Polina Gubareva, Dakshina Acharya, David Reed
Department of Periodontics, UIC College of Dentistry,
Department of Oral Biology, UIC College of Dentistry

Objectives: Periodontal disease causes alveolar bone loss in a complex, multifactorial etiology that results in chronic inflammation. Understanding the molecular mechanism

controlling the anabolic and catabolic regulation of bone in alveolar tissues can help identify new therapeutic targets for treating periodontitis. Recent discovery has demonstrated that the loss of type VI collagen leads to lower levels of alveolar bone. NG2/CSPG4 is a type I transmembrane proteoglycan that binds with type VI collagen and is found in mineralizing tissues such as the growth plate cartilage and cranial sutures. There is an important gap in knowledge related to if NG2/CSPG4 regulates the density and organization of alveolar bone. The objective of this study is to define the role of NG2/CSPG4 in the growth and development of alveolar bone.
Methods: To characterize alveolar bone in vivo, skulls from 16-week-old male and female, control and NG2/CSPG4 knockout mice were collected, fixed overnight in 4% paraformaldehyde, and μCT scanned at 70 kV at a resolution of 12 μm voxel size. A region of interest (ROI) was contoured that included the alveolar bone measuring 140 slices centered between the roots of the first molar. The ROI was analyzed using the Trabecular Analysis package (Scanco Medical). Means comparing sex and genetic differences were compared using a one-way ANOVA with post-hoc Tukey corrections ($\alpha = 0.05$). A sample size of 5 was used for the study.
Results: When comparing male and female mice, there was a sex-dependent decrease in the ratio of bone volume to total volume and bone mineral density in both control and NG2ko mice ($p < 0.01$; $n = 5$), a sex-dependent decrease in trabecular thickness was observed only in the NG2ko mice ($p < 0.05$; $n = 5$), and a sex-dependent decrease in trabecular number was observed only in control mice ($p < 0.01$; $n = 5$). When comparing control and NG2ko mice, there was an NG2-dependent decrease in trabecular number, but only in female mice ($p < 0.05$; $n = 5$).
Conclusions: The outcomes from this study illustrate that NG2/CSPG4 is involved in the homeostasis of alveolar bone microstructure in female mice. This finding is consistent with parallel studies illustrating that NG2/CSPG4 regulates subchondral bone quality in the temporomandibular joint. Further, these results are consistent with findings from Col6a2 knockout mice, illustrating parallel and convergent ligand-receptor signaling. This is the first report implicating NG2/CSPG4 in alveolar bone homeostasis, indicating NG2/CSPG4 could be a novel therapeutic target and biomarker for bone resorption in diseases such as periodontitis.
Approval: ACC Protocol Number 23-042
Funding: NIH R01 DE029835

14. SPATIAL TRANSCRIPTOMICS OF MICROENVIRONMENTAL NICHES IN PERIODONTITIS AND ORAL CANCER

Jonathan Haller, Jessica Castillo, Mateusz S. Wietecha
Department of Periodontics, UIC College of Dentistry,
Department of Oral Biology, UIC College of Dentistry

Objectives: Chronic wounds and tumors share many dysregulations of stromal pathways, including hyper-inflammation, aberrant angiogenesis and fibrosis. Periodontitis (PD) lesions may be described as non-healing wounds, whereas oral

squamous cell carcinomas (OSCC) are akin to over-healing wounds. Single-cell studies highlighted the cellular heterogeneities within PD and OSCC microenvironments. Spatial transcriptomics (ST) enables the profiling of global gene expression within histological tissue sections. The study's aim was to use comparative ST analyses of PD and OSCC lesions to identify cellular niches driving their pathogenesis.
Methods: ST datasets of human PD (GSE206621,N=3) and OSCC Stages I-IV (GSE208253,N=12) were obtained from GeneExpressionOmnibus. R(v4.4.1) in RStudio(v2024.09.0) was used to re-analyze datasets. Seurat(v5.1.0) was used for quality-control, individual and integrated analyses of ST and OSCC datasets, including batch-correction and visualization. SPOTlight(v1.8.0) was used for spatial voxel deconvolution into predicted cell types. CellChat(v2.1.2) was used to identify putative cell-cell interactions among spatially-adjacent voxels. SPATA2(v3.0.0) was used for histological image annotation. EnrichR was used to functionally enrich spatially/differentially expressed genes.
Results: Integrated spatial voxel analysis of PD and OSCC resulted in ten transcriptionally-distinct niche clusters. Functional annotation resulted in: four epithelial clusters, ranging from basal/proliferative to more differentiated cell niches; six stromal clusters, ranging from matrix-enriched/fibrotic to immune-enriched/inflammatory niches. Deconvolution showed varying contributions of several epithelial, immune and mesenchymal cell subtypes to the spatial niches, and CellChat predicted strong interactions between proliferative epithelial and fibrotic stromal niches. Histological annotation and subsequent comparative analyses revealed common enrichment of fibrotic vs non-fibrotic stromal niches in areas closer to the PD lesion and the OSCC leading edge but differential enrichment of immune-rich niches.
Conclusions: PD and OSCC activate adjacent stromal niches toward a common pro-fibrotic signature. Future studies will integrate additional datasets, including gingivitis and premalignant lesions to study dynamics of pathogenesis.
Approval: N/A
Funding: NIH R35 GM154921, Wound Healing Society Research Grant Award

15. STORAGE AND BIOACTIVITY OF A SALIVARY PROTEIN BIOMIMETIC IN BIOTENE™

Nadeen Hammad, Kassapa Jayo Bandara Ellepola, Russell Pesavento
Department of Oral Biology, UIC College of Dentistry

Objectives: We have previously prepared and tested a dual functioning salivary biomimetic (CeO2-NP-CSA-B) in both caries prevention and antioxidant capacity. Chronic reduced salivary flow (xerostomia) is associated with increased incidence of dental caries and other oral pathologies linked to oxidative stress. Biotene™ (Haleon) is a commercially available artificial saliva recommended by dentists for oral lubrication and use in chronic xerostomia patients, but currently lacks functional capacity to mimic salivary agglutination or antioxidant capacity. Our objectives were to i) evaluate Biotene™ as a storage media for CeO2-NP-CSA-B and ii) quantify both the in vitro clearance of Streptococcus mutans and antioxidant activity of Biotene™

supplemented with and without CeO2-NP-CSA-B.
Methods: Chondroitin sulfate A (CSA) coated cerium oxide nanoparticle (CeO2-NP) aggregates (CeO2-NP-CSA-B) were prepared by literature methods and stored in sodium bicarbonate buffer at slightly basic pH (8.3-8.7). Biotene™ (Haleon) was purchased commercially and used without any further manipulation except where noted. CeO2-NP-CSA-B was dispersed in Biotene™ over a range of concentrations and its bulk properties were monitored both visually (homogeneity), via pH measurements and through scattering techniques (Dynamic Light Scattering, DLS) in comparison to other CeO2 NPs. UV-Vis spectroscopy (absorbance at 600 nm) was used to measure time dependent clearance of S. mutans cells in CeO2-NP-CSA-Biotene™ mixtures in comparison to non-enriched Biotene™ via the sedimentation assay known in the literature. A series of in vitro antioxidant assays (i.e., Amplex Red/Catalase Assay) were carried out to establish the antioxidant capacity of Biotene™ with and without CeO2-NP-CSA-B in comparison to other CeO2-NPs.
Results: In comparison to single CeO2-NP (3-5 nm) without CSA, CeO2-NP-CSA-B demonstrated stability at high concentrations (5 mM) in Biotene™ mixtures over several days at room temperature with no change in consistency. The overall effect of the dispersion was a slight increase in pH to approx. (7-7.4). Commercially available Biotene™ was inactive as an agglutination agent towards S. mutans over 2 h of incubation with planktonic cells. However, the addition of CeO2-NP-CSA-B (1000 μM, Ce) to Biotene™ resulted in rapid and effective clearance of S. mutans in 30 min at 37 °C. Similarly, Biotene™ supplemented with CeO2-NP-CSA-B significantly increased its catalase activity, mimicking the function of the naturally occurring catalase enzymes in saliva.
Conclusions: CeO2-NP-CSA-B demonstrated excellent dispersibility in Biotene™ at high concentrations with little changes to its bulk properties with enhancement of both agglutinin and catalase function. Biotene™ is a promising media to formulate CeO2-NP-CSA-B with the potential to enhance its biological function for xerostomia patients.
Approval: N/A
Funding: N/A

16. MICROFIBRILLAR-ASSOCIATED PROTEIN 5 AND THE REGULATION OF SKIN WOUND HEALING

Chen Han, Heidi Yuan, Lin Chen, Timothy J. Koh, Luisa A. DiPietro
Center for Wound Healing and Tissue Regeneration, UIC College of Dentistry, Department of Kinesiology and Nutrition, UIC College of Applied Health Sciences

Objectives: Recent studies in our lab have shown that microfibril-associated protein 5 (MFAP5, or microfibril-associated glycoprotein2/MAGP2) is upregulated in skin wound healing and may modulate fibroblast phenotype. Our studies utilizing MFAP5 deficient (Mfap5-/-) mice have demonstrated that MFAP5 is involved in skin wound

closure, angiogenesis, inflammation, and collagen synthesis. Specifically, Mfap5-/- mice exhibited reduced rates of skin wound closure and angiogenesis, but enhanced wound inflammatory cell influx as compared to control (Mfap5+/+) mice. Additionally, the normal skin (NS) of Mfap5-/- mice had decreased collagen content, altered collagen maturation, and reduced dermal width. However, the breaking strength of NS as well as wound tissue was unaffected by the loss of MFAP5. The aim of this study was to investigate MFAP5's role in regulating fibroblast transcriptome and phenotype.
Methods: Single-cell RNA sequencing was performed on Mfap5+/+ and Mfap5-/- NS and wound tissue. Cell-cluster identification, differential marker gene analysis, and gene enrichment were done to examine the biological functions of fibroblasts differentially expressing MFAP5 and to assess how the loss of MFAP5 affects fibroblasts in vivo. To determine how the loss of MFAP5 affects fibroblast transcriptome and phenotype in vitro, skin fibroblasts were isolated from neonatal Mfap5+/+ and Mfap5-/- mice and cultured. RNA sequencing and gene enrichment analyses were then conducted. To assess the functional changes associated with the loss of MFAP5, we performed comparative analyses of cell migration, contractility, proliferation, and ECM deposition on Mfap5+/+ and Mfap5-/- fibroblasts.
Results: Cell-cluster identification and differential marker gene analysis of our single-cell RNA sequencing of mouse wounds revealed a fibroblast subset that highly expresses MFAP5. Gene enrichment of the differentially expressed genes in this fibroblast subset indicates they may be important for ECM synthesis and organization. Additionally, the loss of MFAP5 in vivo resulted in significant alterations to the fibroblast transcriptome. In vitro, RNA sequencing revealed that genes involved in cellular migration, proliferation, and ECM organization were downregulated in Mfap5-/- fibroblasts relative to Mfap5+/+ fibroblasts. Functionally, Mfap5-/- fibroblasts exhibited significantly reduced cell migration, contractility, proliferation, and COL1A2 deposition in vitro.
Conclusions: Although MFAP5 is likely dispensable for complete wound resolution, our studies demonstrate that it is a multifunctional molecule in healing wounds. Our work also suggests that MFAP5 is an important regulator of fibroblast characteristics that are important to fibrosis and scar formation.
Approval: ACC Protocol Number 23-155
Funding: NIH R01 GM050875, NIH R35 GM139603, NIH F31 DE028747, NIH F31 AR082287

17. DMP1 STIMULATED DPSC EXOSOMES PROMOTE OSTEOGENESIS IN PDLSC

Sowmya Hemanthakumar, Amudha Ganapathy, Velavan Bakthavachalam, Yinghua Chen, Anne George
Department of Oral Biology, UIC College of Dentistry

Objectives: Periodontitis is an inflammatory disease caused by dental plaque, affecting nearly 90% of people worldwide and leading to serious oral health issues if untreated. Cell tissue engineering is a promising method for repair, with stem cells playing a key

role. Exosomes from stem cells function in immune regulation by transferring proteins, nucleic acids, lipids, and metabolites that support communication and healing. Exosomes from dental pulp stem cells have characteristics like astrocytes, making them relevant for tissue regeneration. Dentin matrix protein 1 (DMP1) regulates matrix mineralization by mineral deposition, highlighting its importance in dental health. We hypothesize that exosomes from DMP1-expressing DPSC can enhance the osteogenic differentiation of periodontal ligament stem cells (PDLSCs), offering new approaches for treating periodontitis and aiding tissue repair.
Methods: DPSC-EXO was isolated via ultracentrifugation to obtain high-purity vesicles based on size and density, characterized by nanoparticle tracking analysis and Western Blot for size distribution and exosome markers. PDLSCs were treated with DPSC-EXO and DMP1-treated DPSC-EXO for 24 and 48 hours, after which cell proliferation, migration, and osteogenic potential were evaluated. The effects on the osteogenic potential of PDLSCs were assessed with alizarin red staining for matrix mineralization, and qRT-PCR and Western Blot analysis were performed for gene and protein expression levels.
Results: PDLSCs stimulated with DPSC DMP1-EXO showed enhanced proliferation, migration, and osteoblast differentiation. RT-PCR validation showed a significant increase in osteogenic gene expression (ALPL, Collagen 1, collagen X, OPN, RUNX2) with DMP1-EXO compared to DPSC-EXO. Upregulation of protein levels of Collagen X, OPN, and ALPL suggests that DMP1-stimulated DPSC-EXO contains osteogenic transcription factors and the presence of key proteins required for osteogenic differentiation and matrix mineralization of PDLSC.
Conclusions: DMP1-stimulated DPSC-EXO enhances the osteogenic differentiation of PDLSCs, suggesting a new acellular therapy methodology for periodontitis compared to regular DPSC exosomes."
Approval: N/A
Funding: NIH R01 DE031737, NIH R01 DE028531, and The Brodie Endowment

18. MICROENVIRONMENTALLY ENGINEERED DPSCS REGENERATE INFERIOR ALVEOLAR NERVE

Jin Hong, Sreelekshmi Sreekumar, Ji Hyun Kim, Seung Chung
Department of Oral Biology, UIC College of Dentistry

Objectives: Inferior alveolar nerve (IAN) regeneration is essential for proper nerve sensation as well as maintaining tooth integrity and function. A promising attempt to regenerate peripheral nerve involves the cell-based therapy that can differentiate to neurons and/or secrete trophic factors to promote nerve regeneration. There is increasing evidence that transplanted stem cells promote peripheral nerve regeneration and restore some degree of motor function in human clinical trials, but the overall outcomes are inconsistent and not completely satisfactory.
Methods: This study adopts an innovative and alternative approach to IAN regenerative sciences by leveraging the neurotrophic features of microenvironmentally engineered dental pulp stem cells (DPSCs). Human DPSCs were prepared from

healthy molars and cultured in regular and osteogenic media treated with PARP-1 antagonist, C5aR antagonist with or without hypoxia, and transplanted into the IAN regeneration model using type I collagen matrix.
Results: Our data demonstrate that adjusting the microenvironments during DPSC differentiation by hypoxia, cell-to-cell contact and modification of the receptor/intracellular signaling significantly enhanced neurotrophic capacity of the differentiated cells. Our DPSC-derived cells by the nuclear enzyme, PARP-1 inhibition and complement C5a receptor (C5aR) blocking under hypoxia show significantly enhanced brain-derived neurotrophic factor (BDNF) and erythropoietin (EPO) secretion as well as enhanced proliferation capacity. As several previous and our studies demonstrate that BDNF and EPO are critical factors governing nerve growth and myelination, we next applied these engineered DPSCs into our mouse IAN regeneration model. Our data confirm that the transplanted DPSCs can regenerate the dissected IAN in our mouse IAN model, and p38 is activated and required at the regenerating IAN and this is BDNF dependent.
Conclusions: Taken together, our data provide a fundamental understanding and strategy for the DPSC-based stem cell therapy in IAN regeneration.
Approval: IRB Protocol Number 2011-0129, ACC Protocol Number 20-062
Funding: NIH R03 DE02863

19. CHONDROITIN SULFATE-NANOCERIA FORMATIONS MODULATING OXIDATIVE STRESS IN MANDIBULAR FIBROCHONDROCYTES

Rokas Jastiuginovas, Dakshina Acharya, Russell Pesavento, David Reed
Department of Oral Biology, UIC College of Dentistry

Objectives: Oxidative stress is a key factor leading to cartilage degeneration during temporomandibular joint post-traumatic osteoarthritis (TMJ PTOA). There are currently no disease modifying therapeutics for TMJ PTOA and oxidative stress pathways represent a promising molecular target for clinical intervention. Cerium oxide nanoparticles (nanoceria, CeO2-NP) suppress oxidative stress in appendicular cartilage explants and, when formulated with a proteoglycan such as chondroitin sulfate, can attenuate the injury response of tendons. The objective of this study is to determine if chondroitin sulfate A-nanoceria (CeO2-NP-CSA) pretreatment suppresses the reactive oxidative radical species release following the injury response of primary mandibular fibrochondrocytes.
Methods: Immortalized mandibular fibrochondrocytes (iMFC) were used for this study. CeO2-NP-CSA was prepared by literature methods. Cells were grown to confluence and pretreated for 4-hour with either a CeO2-NP-CSA formulation or saline vehicle control. Following pretreatment, plates were rinsed three times with sterile saline and then treated with 230 □M H2O2 for 1 hour to induce an oxidative stress response. Plates were washed with ice cold sterile saline and RNA was isolated (RNease, Qiagen). Differential gene expression was calculated using RTqPCR for

genes in the autophagy and oxidative stress pathways. Key biomarkers were further screened by immunocytochemistry. Means were compared using a one-way ANOVA with post-hoc Tukey corrections ($\alpha = 0.05$). A sample size of four replicates was used in all experiments.
Results: H2O2 induced an increased the expression of oxidative stress biomarkers MMP9 and IL1β ($p<0.01$; $n = 4$) but not in HO-1, Cox2, Nrf2, and iNOS or autophagy biomarker LC3. Pretreatment with CeO2-NP-CSA resulted in reduction in Cox2, Nrf2, HO1, iNOS, and LC3 that approach significance. Pretreatment with CeO2-NP-CSA did not reduce MMP9 or IL1β, leading to an increase in IL1β following CeO2-NP-CSA pretreatment without H2O2.
Conclusions: This study illustrates that the CeO2-NP-CSA formation may be an effective therapeutic modulator of some key oxidative stress biomarkers in the Nrf2/HO1 pathway but that H2O2 is not an appropriate in vitro assay to test this hypothesis in the iMFC cell line. Further, our findings illustrate that CeO2-NP-CSA formation is not an effective modulator of the gelatinase MMP9 nor the cytokine IL1β. This could be therapeutically valuable as both biomarkers are implicated in the injury response of the TMJ and could promote regenerative pathways independent of the Nrf2/HO1 pathway. Future work will focus on developing an in vitro assay of oxidative stress that specifically targets the Nrf2/HO1 pathway.
Approval: ACC Protocol Number 23-042
Funding: NIH R01 DE029835

20. DMP1 MEDIATED ACTIVATION OF PHOSPHATE REGULATED TARGETS IN PDLSCS

Khushroop Kaur, Ava Robbins, Cassandra Alyssa Villani, Anne George
Department of Oral Biology, UIC College of Dentistry

Objectives: DMP1 is responsible for bone mineralization and phosphate homeostasis during mineralized matrix formation. Transcriptomic analysis of DMP1 treated PDLSCs (periodontal ligament stem cells) overexpressing GRP78 (hPDLSC_OEGRP78) showed changes in phosphate regulated genes when compared with control PDLSCs. Therefore, we hypothesize that DMP1-GRP78 interactions support mineralization of PDLSCs by activating phosphate regulators.
Methods: Total RNA from PDLSCs stimulated with DMP1 was isolated for bulk RNA sequencing. Control PDLSCs and PDLSCs stably overexpressing GRP78 (hPDLSC_OEGRP78) were treated with DMP1 and cultured for 0, 2, 4, 6 hours under growth conditions. Gene ontology analysis was used to find pathways enriched by differentially expressed genes. Real-time reverse transcriptase polymerase chain reaction (qRT-PCR) was used to validate phosphate regulating targets.
Results: Gene ontology analysis of control PDLSCs stimulated with DMP1 showed enrichment of positive regulation of phosphate and organophosphate metabolism pathways (Fold enrichment = 1.24 and 1.25 respectively). RT-PCR validation showed

a positive association with RNA-sequencing data (R2 = 0.8711). In control PDLSCs, gene expression of OPN was downregulated (FC = 0.49) while OCN (FC = 2) and BMP4 (FC = 1.5) was upregulated. In hPDLSCs_OEGRP78, gene expression of OPN (FC = 2), OCN (FC = 5.4), and BMP4 (FC = 7.9) were significantly upregulated.
Conclusions: Downregulation of OPN, a mineralization inhibitor, in PDLSCs treated with DMP1, and upregulation of OCN and BMP4, which are positive regulators of mineralization, in PDLSCs overexpressing GRP78 treated with DMP1 suggests that interactions of DMP1 with its receptor GRP78 is necessary for activating phosphate regulators. These matrix proteins promote osteogenic differentiation of PDLSCs and matrix mineralization.
Approval: N/A
Funding: NIH R01 DE031737, R01 DE028531, The Brodie Endowment Fund

21. TRANSCRIPTOMIC DIFFERENCES BETWEEN ORAL AND SKIN KERATINOCYTE HEALING RESPONSES

Shalyn Keiser, Chen Han, Heidi Yuan, Trevor Leonardo, Lin Chen, Luisa A. DiPietro, Mateusz S. Wietecha
Department of Oral Biology, UIC College of Dentistry,
Center for Wound Healing and Tissue Regeneration, UIC College of Dentistry

Objectives: Skin and oral mucosal wounds exhibit site-specific differences in their transcriptomic response to injury. Compared to skin wounds, oral mucosal wounds heal more quickly, with less inflammation and minimal scarring. Since faster re-epithelialization is also a feature of oral wounds, the keratinocytes may be one important differentiating factor for enhanced healing compared to skin wounds. The aim of this study was to investigate whether the intrinsic differences between oral and skin keratinocytes would be reflected in their transcriptome at baseline and after injury.
Methods: In this study, we used two keratinocyte cell lines: Human skin keratinocytes (HaCaT) and human gingival keratinocytes (TIGK). The migratory and proliferative capacity of HaCaT and TIGK were assessed by an in vitro scratch wound and MTS assay, respectively. RNA was isolated from HaCaT and TIGK at 0-, 6-, and 24 hours (h) post-scratch and mRNA sequencing was performed. The most highly expressed genes were compared to published datasets of human primary skin and oral keratinocytes. Differentially expressed genes (DEGs) were identified between HaCaT and TIGK at baseline and throughout in vitro healing. To elucidate potentially relevant physiological differences between skin and oral keratinocytes, we performed gene set enrichment analysis (GSEA) of gene ontology biological processes (GO BP) and Reactome terms on the gene sets of HaCaT and TIGK at each timepoint during healing. Based on our enrichment analyses, we stimulated HaCaT with Interferon (IFN) Type I and assessed changes to HaCaT migratory capacity.
Results: HaCaT and TIGK showed remarkable transcriptional similarities to primary human skin and oral keratinocytes, respectively. TIGK exhibited a faster overall transcriptional response to injury and differential expression of genes encoding several

transcription factors, integrins, and matrix metalloproteinases. GSEA analyses of transcriptomic changes in response to injury between HaCaT and TIGK identified several differentially enriched pathways, notably IFN-1 signaling as being more highly enriched in TIGK than in HaCaT. Following IFN Type I treatment, HaCaT exhibited significantly faster migration compared to controls.
Conclusions: Our comparative analyses suggest that specific transcriptomic differences between oral and skin keratinocytes at baseline and in response to injury may underlie the healing advantages of oral mucosal wounds. Specifically, IFN-1 signaling may be one therapeutic target for enhancing the healing of skin wounds.
Approval: N/A
Funding: NIH R01 GM050875, NIH R35 GM139603, NIH F31 DE028747, NIH F31 AR082287, NIH R35 GM154921, Wound Healing Society Research Grant Award

22. BIOCOMPATIBILITY OF B-TYPE PROANTHOCYANIDIN DESIGNERS WITH DENTAL PULP STEM CELLS

Jeffrey Kim, José Guilherme Neves, Shuxi Jing, Shao-Nong Chen, Guido Pauli, Ana Bedran-Russo
Department of Oral Biology, UIC College of Dentistry,
Department of Pharmaceutical Sciences, UIC College of Pharmacy

Objectives: Proanthocyanidin (PAC) are plant-derived biopolymers that elicit many biological responses and have been explored as novel functional dental biomaterials. Standardized formulations of PACs can translate their use at interventional. This study investigated the effect of two highly active PAC DESIGNERs on pulp cell biocompatibility as prerequisite for their development as interventional materials.
Methods: B-Type PACs were extracted from Theobroma cocoa and standard formulations were produced by depletion and enrichment of select ingredients generating normalized extract resources (DESIGNER) approach based on the degree of polymerization (DP): dimer (DP2) and trimer (DP3). Dental Pulp Stem Cell (DPSC) culture media were prepared and allocated into the experimental groups and different concentrations (1, 10, and 100 µg/mL). The DPSC culture using the regular media was considered a positive control, and a regular media without cells was used as a negative control. The DPSC were seeded on the microplate using a concentration of 30x103 cells/well, incubated at 37oC and the viability and a live/dead assay were performed after 1, 3 and 5 days. The absorbance data were statistically analyzed using analysis of variance (ANOVA) and post-hoc tests (α=0.05).
Results: Both PAC-DESIGNERs exhibited good cell biocompatibility. No differences were observed between the groups at 1 µg/mL ($p=0.691$) and 10 µg/mL ($p=0.786$). The DP3 DESIGNER increased the cell metabolism when compared to DP2 at 100 ug/mL ($p=0.009$). After 3 days the cell metabolism showed a different behavior when compared with other timepoints ($p<0.05$). No differences in cell metabolism behavior were observed between 1 day and 5 days ($p>0.05$). The live and dead assay showed a

healthy cell morphology and similar amounts of cell death among experimental groups.
Conclusions: B-type PAC DESIGNERs presented satisfactory pulp cell biocompatibility, ensuring their application as a dentin biomodulation material. At the highest concentration, trimers showed beneficial effects on pulp cell proliferation.
Approval: N/A
Funding: NIH R01 DE028194

23. CRISPR-ENGINEERED, BDNF OVEREXPRESSING DPSCS ENHANCE DENTIN REGENERATION

Ji Hyun Kim, Muhammad Irfan, Sreelekshmi Sreekumar, Atsawasuwan Phimon, Seung Chung
Department of Oral Biology, UIC College of Dentistry,
Department of Orthodontics, UIC College of Dentistry

Objectives: Dental caries is a common disease and represents a major public health problem. Untreated, it causes pain, leads to endodontic therapy, restoration or tooth loss. An alternative is therapeutic dentin regeneration. Yet, this remains clinically elusive. This study aims to enhance dentin regeneration in injured teeth by investigating the role of brain-derived neurotrophic factor (BDNF) and its receptor TrkB in dental pulp stem cell (DPSC)-mediated dentinogenesis, particularly under inflammatory conditions. Additionally, we explore the potential of stem cell engineering to improve dentin regeneration.
Methods: TrkB expression and activation in DPSCs were assessed during odontogenic differentiation, with and without inflammatory inducers such as TNFα, LPS, and LTA. A mouse pulp-capping/caries model was used for the in vivo evaluation of dentin formation, where CRISPR-engineered DPSCs overexpressing BDNF were transplanted into inflamed pulp tissue. Transcriptomic profiling was performed on TNFα-treated DPSCs, with and without TrkB antagonist CTX-B, to identify downstream pathways involved.
Results: TrkB expression and activation in DPSCs were significantly upregulated during odontogenic differentiation, especially under inflammatory stimulants by 301 ± 17, 320 ± 15.2, and 250 ± 19, respectively vs control 165 ± 12.4 ($p < 0.01$). In vivo, the transplantation of BDNF-overexpressing DPSCs led to enhanced dentin regeneration in the mouse model by increasing the dentin volume to 1241 ± 51 mg HA/ccm vs control 1169 ± 9 mg HA/ccm ($p < 0.05$). Transcriptomic analysis revealed that TrkB inhibition led to significant transcriptional alterations related to immune response, cytokine signaling, and extracellular matrix interactions.
Conclusions: This study underscores the crucial role of BDNF and TrkB in DPSC-mediated dentin regeneration, particularly in the presence of inflammation. Through BDNF overexpression, stem cell engineering shows promise for enhancing dentin repair in injured teeth, providing potential therapeutic strategies for improved dental tissue regeneration.

Approval: ACC Protocol Number 21-197
Funding: NIH R01 DE029816

24. MICROENVIRONMENTALLY ENGINEERED DPSCS ENHANCE NERVE MYELINATION

James Kim, Sreelekshmi Sreekumar, Seung Chung
Department of Oral Biology, UIC College of Dentistry

Objectives: A promising attempt to regenerate nerve involves the cell-based therapy that can differentiate to neuroglial cells and/or secrete trophic factors to promote axon remyelination and regeneration. There is increasing evidence that exogenous transplanted cells promote nerve regeneration. The proposed project adopts an innovative and alternative approach to nerve regenerative sciences by leveraging the neurotrophic features of microenvironmentally engineered dental pulp stem cells (DPSCs). The nuclear enzyme poly (ADP-ribose) polymerase 1 (PARP-1) is an ADP-ribosylating enzyme, which has roles in DNA repair and transcriptional regulation, and we recently identified the PARP-1 as a key modulator in controlling BDNF secretion and proliferation of the DPSC. Here, we further seek its role in nerve myelination process.
Methods: Human DPSCs were prepared from healthy molars and cultured in regular and osteogenic media treated with PARP-1 antagonist, erythropoietin (EPO) with or without hypoxia, and transplanted into a mouse Periventricular leukomalacia (PVL) model using type I collagen matrix.
Results: Our data demonstrate that DPSCs stimulate oligodendrocyte differentiation and PARP-1 inhibition under hypoxia during DPSC differentiation shows a significant increase in cell proliferation and brain-derived neurotrophic factor secretion compared to mesenchymal stem cell-derived cells. Further, we identified that EPO is a key factor in remyelination and modified DPSCs demonstrate an enhanced EPO production. Transplanted DPSCs were able to enhance nerve myelination in the mouse PVL model and in vitro myelination is dependent on the p38 pathway.
Conclusions: Taken together, our data provide mechanistic and molecular understanding for microenvironmentally modified DPSC-based cell therapy in nerve myelination and create future targets for therapeutic tools.
Approval: IRB Protocol Number 2011-0129, ACC protocol Number 20-062
Funding: NIH R03 DE02863

25. CAMKII REGULATES INFLAMMATORY DPSC DENTINO-DIFFERENTIATION VIA BDNF SIGNALING

Stephanie Kim, Ji Hyun Kim, Muhamad Irfan, Satish Alapati, Seung Chung
Department of Oral Biology, UIC College of Dentistry,
Department of Endodontics, UIC College of Dentistry

Objectives: CaMKII is a serine/threonine-specific protein kinase that plays a crucial role in both normal and pathological conditions. However, limited information is available regarding the roles of CaMKII in dentinogenesis, particularly in an inflammatory context. Previously, we demonstrated the pivotal role of TrkB in inflammation-induced differentiation of hDPSCs into odontoblast-like cells. Here, we investigate the interaction between CaMKII and TrkB during hDPSCs odontogenic differentiation. hDPSCs were cultured and subjected to CaMKII knockdown using siRNA, followed by treatment with dentinogenic media.
Methods: TNFα-stimulated cells were treated with CaMKII- inhibitor, -protein, or CTX-B. Immunocytochemistry and ARS were used to visualize targeted proteins and calcium deposits. Real-time PCR detected expression levels of odontogenic and mineralization markers such as DSPP and DMP-1.
Results: Our data show that inhibition of CaMKII interacts with TrkB by increasing protein levels and enhancing TNFα-induced odontogenic differentiation's transcriptional activity. The expression of CaMKII and p-CaMKII was confirmed in human and mouse teeth. CaMKII siRNA-mediated knockdown and CaMKII inhibitor increased the protein levels of DSPP and DMP-1, while the application of CaMKII protein decreased their expression. Notably, treatment with CTX-B abolished its expression, respectively. Similarly, mRNA expression of DSPP and DMP-1 was reduced at day 10. Mineralization activity exhibited a similar pattern to the expression of these markers.
Conclusions: Our findings unveil a novel mechanism underlying the role of CaMKII via TrkB in dentinogenesis, which is vital for the success of hDPSCs engineering strategies.
Approval: N/A
Funding: NIH R01 DE029816

26. THE ROLE OF LYSINE DEMETHYLASE 5A IN HEAD AND NECK CANCER

Sandy Ku, David Crowe
Department of Periodontics, UIC College of Dentistry

Objectives: Head and neck cancers (HNSC) occur frequently in countries around the world. The majority of HNSC patients presents with advanced disease. Recurrent disease is a major clinical issue, and survival rate for these patients is low. One of the most frequently altered epigenetic modifiers in HNSC is lysine demethylase 5A (KDM5A). KDM5A demethylates lysine 4 of histone H3, leading to target gene repression. Despite frequent KDM5A alterations in HNSC, the role of this gene in head and neck carcinogenesis is unknown.
Methods: A genetically engineered in vivo model was created in which KDM5A expression is deleted in stratified epithelia. The model was used to assess differentiation, cellular senescence, proliferation, tumor growth, metastasis, and

the correlation of DNA strand breaks with differentiation. Additionally, the role of KDM5A in targeting keratin 10, a differentiation marker, was investigated.
Results: K14Cre;KDM5Af/f HNSC exhibited increased differentiation, cellular senescence, and reduced proliferation, tumor growth, and metastasis. DNA single and double strand breaks did not correlate with differentiation observed in K14Cre;KDM5Af/f HNSC. KDM5A targeted and repressed keratin 10 expression, a differentiation marker in HNSC.
Conclusions: KDM5A inhibition promotes cellular senescence and differentiation in vivo. HNSC differentiation was regulated by KDM5A targeting of the keratin 10 gene.
Approval: ACC Protocol Number 23-001
Funding: University of Illinois Cancer Center

27. ENDOGENOUS PROTEASE MEDIATED DELIVERY OF ENGINEERED IMMUNOMODULATORY EXTRACELLULAR VESICLES

Kasey Leung, Miya Kang, Koushik Debnath, Chun-Chieh Huang, Sadiq Umar, Yu Lu, Sriram Ravindran
Department of Oral Biology, UIC College of Dentistry

Objectives: Mesenchymal stem cell-derived extracellular vesicles (MSC-EVs) can be modified to possess function-specific properties. By controlling the engineered EV spatial and temporal release, their therapeutic outcomes can be optimized. Our objectives were to engineer MSC-EVs that target the NLRP3 inflammasome pathway for enhanced anti-inflammatory function and to create a hydrogel-based system for protease-triggered EV release during the inflammatory phase of healing.
Methods: A lentiviral system was used to selectively transport mature miR-22-3p (an anti-inflammatory miRNA that targets the NLRP3 gene) into EVs. miR-22-3p expression was verified by RT-qPCR, and anti-inflammatory activity of the engineered EVs was evaluated in mouse macrophages at the gene and protein level. A fusion peptide with an MMP2 recognition sequence and RGD tether was conjugated to alginate. Release kinetics of EVs from the fusion peptide-containing hydrogels in the presence of MMP2 was evaluated using quantitative protein-based assays. Retention of engineered EV function after hydrogel delivery on primary mouse macrophages was evaluated with RT-qPCR and ELISA (n=3). Student's t-test or ANOVA followed by Tukey's test were used (CI=95%).
Results: miR-22-3p expression was enhanced in engineered EVs. Engineered EVs had greater anti-inflammatory activity compared to control EVs. The MMP2-RGD fusion peptide was successfully conjugated to alginate. The quantity of EVs released from the fusion peptide-containing hydrogel increased in the presence of MMP2 and had a decreased t1/2 value compared to controls. EVs released from hydrogels retained their anti-inflammatory function.
Conclusions: MSC-EVs can be modified to contain elevated levels of miR-22-3p, boosting their anti-inflammatory effects. Alginate hydrogels with a fusion peptide can

release these functional EVs in response to MMP2 activity. As MMP2 is present during the inflammatory and macrophage recruitment phase of healing, this system allows for spatial and temporal control of engineered EV delivery at wound sites.
Approval: ACC Protocol Number 20-158
Funding: NIH F30 DE033904, NIH R01 DE027404, NIH R01 DE030495

28. NITRATE ENRICHMENT REDUCES VOLATILE SULFUR COMPOUNDS IN HUMAN SALIVA

Wei Li, Michael W. Dodds, Minmin Tian, Christine D. Wu
Department of Pediatric Dentistry, UIC College of Dentistry, Global Innovation Center, William Wrigley, Jr. Company, Chicago, IL

Objectives: Dietary nitrate is metabolized to nitrite by nitrate reductase, an enzyme unique to oral bacteria. Nitrite is further reduced to nitric oxide, absorbed into the blood and promote cardiovascular health. However, these oral bacteria may also utilize dietary proteins to generate volatile sulfur-containing compounds (VSCs) associated with halitosis. We hypothesize that oral bacteria with a ready source of nitrate will downregulate VSC-producing enzymes thus reducing halitosis and benefit health. This study investigated the effect of nitrate on VSC generation by human saliva and by selected oral bacteria associated with halitosis.
Methods: Stimulated whole saliva was collected from three adult volunteers over a 5-minute period while chewing 1g unflavored unsweetened gum base. Saliva bacteria and selected oral bacteria associated with oral malodor and nitrate reduction (Aggregatibacter actinomycetemcomitans, Actinomyces naeslundii, Rothia mucilaginosa, Veillonella atypica) were mixed with cysteine and/or nitrate and incubated anaerobically. VSCs were evaluated by a gas chromatograph equipped with a sulfur detector, and nitrate reductase activity was assayed using Griess reagent.
Results: Human salivary and selected test bacteria were capable to reduce nitrate to nitrite when nitrate is available. Salivary bacteria were also capable to produce VSCs when cysteine was added. In the presence of nitrate and cysteine, production of VSCs by salivary bacteria was significantly reduced. Similarly, when cysteine was present, inhibition in nitrate reductase activity was also noted. The effect of cysteine on nitrate reductase activity differed among test oral bacteria. Significant inhibition of nitrate reductase activity in the presence of cysteine was observed in Rothia mucilaginosa.
Conclusions: Our data suggest a competitive mode of action in oral bacteria on VSC generation and nitrate reduction. Dietary green leafy vegetables may provide oral bacteria with a ready source of nitrate thus help reducing bad breath and promote overall health benefit.
Approval: IRB Protocol Number 2006-0916
Funding: N/A

29. EVALUATION OF FEMORAL MORPHOLOGY OF MICRORNA-145 DEFICIENT TRANSGENIC MICE

Sullivan Alexander Lown, Natnicha Praneetpong, Toleen Mazloum, Clara Awad, Mallek Nahhas, Nicolas Hok, ZuJian Chen, Grace Viana, Christina Nicholas, Phimon Atsawasuwan

Department of Orthodontics, UIC College of Dentistry

Objectives: There are differences in femoral bone phenotypes between miR-145 deficient 8-week-old mice driven under Sost promoter (miR-145/Sost) versus their control mice: miR-145 flox and Sostcre transgenic mice. To compare the femoral bone phenotypes of the miR-145/Sost mice with their age- and sex-matched control mice groups.
Methods: The bone specimens from miR-145/Sost and their controls were subjected to 3D morphometric analyses to compare macroscopic differences amongst groups. Appropriate statistical analyses were used at a significance level of 0.05
Results: The female groups were found to have a slightly larger morphology in all parameters compared to the males of their respective groups (SostCre, miR-145 flox, miR-145/Sost), with the femoral head size being the most notable. The miR-145/Sost group demonstrated no significant differences in overall length and width of femurs compared to their control groups for their respected sexes, as well as any major deviations from normal morphology.
Conclusions: Although miRNAs are involved in various gene expression of protein productions throughout the body, the silencing of miR-145 through Sost promotor did not cause any significant changes in femoral bone morphology when compared to its controls. Larger sample sizes may be needed to confirm results.
Approval: ACC Protocol Number 23-030
Funding: American Association of Orthodontists Foundation

30. FLEXURAL FATIGUE OF A CERAMIC-MODIFIED 3D RESIN USED FOR DENTURES

Luis Mezzomo, Rangel Lidani, Joao Queirós, Carlos Fernandes, André Correia, Mário Vaz

Department of Restorative Dentistry, UIC College of Dentistry,
Departamento de Odontologia, Universidade Federal de Santa Catarina, Florianopolis, Santa Catarina, Brazil,
Departamento de Engenharia Mecânica, Faculdade de Engenharia da Universidade do Porto (FEUP), Porto, Portugal,
Universidade Católica Portuguesa (UCP), Faculdade de Medicina Dentária, Centro de Investigação Interdisciplinar em Saúde, Viseu, Portugal

Objectives: This study compared the dynamic mechanical behavior (flexural fatigue) of a ceramic-modified 3D printing resin and a Polymethyl-methacrylate (PMMA) puck used in full-arch prostheses.

Methods: A total of 22 rectangular specimens (3.3 x 10.0 x 64.0 mm ± 0.2 mm; ISO 20795-1:2013) were created from CAD/CAM PMMA pucks (Ivotion® Base Pink-V, Ivoclar Vivadent®) and a photosensitive resin (P Pro®, Straumann Group®). These were manufactured using milling (PrograMill PM5, Ivoclar Vivadent®) or 3D printing (Straumann® P Series), respectively. A three-point flexural test was conducted using an INSTRON® EMIC 23-5S machine to measure the average flexural strength of the specimens. Dynamic three-point alternating bending tests (R = -1, f = 2 Hz) were performed using INSTRON® equipment (document number 1) to obtain S-N curves. Proportional limits were set at 40% (n = 4), 50% (n = 4), 60% (n = 4), and 80% (n = 4) of the mean flexural strength for each resin. Each test had a limit of 100,000 cycles, irrespective of the group or load. Fracture surfaces were evaluated for roughness with a Hommelwerke® roughness meter and examined for failure patterns using optical microscopy. Topographies were analyzed with MountainsLab® Premium 10 software without filtering.
Results: The mean 3-point flexural strength values for milled PMMA and 3D printing liquid resin were 90.7 ± 3.4 MPa and 98.7 ± 12.0 MPa, respectively, with no statistical difference ($p > 0.05$). Dynamic flexural tests were performed at 40%, 50%, 60%, and 80% proportional load limits, using loads of 36.28 MPa, 45.35 MPa, 54.42 MPa, and 72.56 MPa for the PMMA group, and 39.48 MPa, 49.35 MPa, 59.22 MPa, and 78.96 MPa for the 3D printing resin. All specimens, except the lower loads (40% and 50%) of the 3D printing resin, failed before 100,000 cycles. The PMMA group showed more variability in failure points, while the 3D printing resin was more brittle. The fracture surfaces analysis revealed that PMMA had greater roughness, indicated by varying ellipses that reflect its elastic behavior upon failure. In contrast, the smoother surface of the 3D printing resin shows its brittle and less resilient nature. Microscopic analysis of the PMMA revealed that failures were linked to incorporated structures, polymerization bubbles, or surface defects. In contrast, the 3D printing resin did not exhibit these failure origins.
Conclusions: The resins show similar static mechanical properties but differ statistically under dynamic loading. Analyses indicate that manufacturing defects and inclusions significantly influence the formation and spread of PMMA cracks, especially under low loads. A load-dependent relationship was observed in the 3D printing resin. While the ceramic-modified resin is a viable alternative to PMMA for dentures, its brittleness increases the risk of catastrophic failure.
Approval: N/A
Funding: Coordination for the Improvement of Higher Education Personnel, Brazilian Ministry of Education, Brazil

31. IMMUNOMODULATORY EXOSOMAL CARGO OF DMP1 STIMULATED PERIODONTAL LIGAMENT STEM CELLS

Ashlin Monish, Cassandra Alyssa Villani, Anne George
Department of Oral Biology, UIC College of Dentistry

Objectives: MicroRNAs are the predominant exosomal cargo that can regulate a variety of cellular processes. During bone development miRNAs regulate many aspects of osteoblast differentiation and play an important role in immune regulation. Previous studies indicated that periodontal ligament stem cells (PDLSCs) treated with dentin matrix protein 1 (DMP1) release exosomes containing miRNA cargo that facilitates osteogenic differentiation with concurrent alterations to immune regulatory pathways. In this study, we demonstrate that PDLSC-derived exosomes stimulated with DMP1 contain a miRNA-rich cargo that could play a paracrine or autocrine role in immunomodulation.
Methods: Exosomes were isolated from PDLSCs cultured with and without DMP1. Total RNA was collected from cell lysate to validate the miRNA targets by qRT-PCR. Predicted and validated gene targets for candidate miRNA were identified using Gene Ontology analysis to identify pathways for immune or inflammatory response. miRNA expression and targets present in these pathways were further evaluated with qRT-PCR. Qiagen miRnome arrays were utilized to assess responsivity of various human miRNA.
Results: Nanosight analysis of the exosomes isolated with or without DMP1 demonstrated the presence of 50-150 nm sized vesicles. Western blot analysis confirmed the presence of the exosomal marker CD63. Gene Ontology analysis showed several targets for miRNAs identified in PDLSCs, namely, miR-146a-5p, miR-155-5p and miR-126-5p which function in cellular inflammatory response, regulation of immune response and cytokine signaling cascades. Additionally, Ingenuity Pathway Analysis (IPA) indicated the targets of each miR has that altered IL-4 and IL-13 signaling through STAT3. Gene expression data from cell lysate revealed several relevant genes, namely, IDO1, IFNA21, and IL29 with significant fold changes.
Conclusions: Exosomal miRNAs enriched in DMP1 stimulated PDLSCs have an immunomodulatory function via interleukin and cytokine signaling. This may indicate a new role for DMP1 and immune signaling during the osteogenic differentiation and mineralization of PDLSCs.
Approval: N/A
Funding: NIH R01 DE031737, NIH R01 DE028531, The Brodie Endowment Fund

32. DESIGNER ENGINEERED PEPTIDES REGULATE ERK SIGNALING IN TMJ CELLS

Priti Mulimani, Dakshina Acharya, Sriram Ravindran, David Reed
Department of Oral Biology, UIC College of Dentistry

Objectives: The Neuron/glial antigen 2 (NG2; CSPG4) plays a critical role in temporomandibular joint (TMJ) mechanobiology and pathogenesis. The internalization of the NG2/CSPG4 intracellular domain (ICD) is associated with hypertrophic chondrocytes, articular chondrocytes during TMJ osteoarthritis (OA), and in primary mandibular fibrochondrocytes loaded in compression. The NG2/CSPG4 ICD contains an acceptor site for ERK 1/2 and is necessary for the mechanical phosphorylation of ERK 1/2. There exists a gap in knowledge related to if the internalization of the

NG2/CSPG4 ICD is sufficient for the phosphorylation of ERK 1/2 in the absence of mechanical loading. We hypothesize that NG2/CSPG ICD mimic peptide internalization will phosphorylate ERK 1/2 (pERK) and elevate downstream targets.
Methods: Peptides from two different regions of the NG2/CSPG4 ICD were engineered with or without a viral trans-activator of transcription (TAT) sequence to promote internalization and fluorescently tagged. Immortalized mandibular fibrochondrocytes were treated with the four peptides at multiple concentrations for 2 hours, or at 3-5 uM for 5 days. Internalization was quantified using a fluorescent plate reader and fluorescent microscopy. Protein levels for pERK and downstream target Runx2 were quantified using in cell western blot.
Results: Fluorescence quantification illustrated a dose dependent increase in both peptides containing the TAT sequence. Fluorescent microscopy illustrated high levels of fluorescence within the cytosol. After the 5 day treatment, only Peptide 2 with the TAT sequence had significant elevation of pERK ($p < 0.0001$; $n = 5$). Additionally, Runx2 was elevated in TAT Peptide 2 compared to all other peptides and controls ($p < 0.01$; $n = 4$).
Conclusions: Our study demonstrates successful engineering of internalized NG2/CSPG4 ICD is associated with elevated pERK and its downstream target Runx2. Our results are consistent with the findings that NG2/CSPG4 internalization is associated with mineralized tissue.
Approval: ACC Protocol Number 23-042
Funding: NIH R01 DE029835

33. EX-VIVO ORAL BIOFILM MODEL FOR RAPID SCREENING OF ANTIMICROBIAL AGENTS

Hiba Naqvi, Wei Li, Elissa Kim, Stefan J. Green, Christine D. Wu, Guy R. Adami
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry, Department of Pediatric Dentistry, UIC College of Dentistry, Genomics and Microbiome Core Facility, Rush University, Chicago, IL

Objectives: The search has been ongoing for safe and effective antimicrobial agents for control and prevention of oral biofilm associated with disease. Clinical trials for oral specific anti-bacterials are costly and often provide inconclusive results. The simple approach of ex vivo testing of these agents has not demonstrated utility, likely due to variability of effects observed even with a single donor.
Methods: We show how shed oral biofilms, easily obtained from donor saliva, and tested under optimized conditions, respond reproducibly to anti-bacterial challenges measured by reductions in 16S rRNA accumulation in susceptible taxa.
Results: Responses are in part donor specific, but many bacteria taxa were shown to be reproducibly susceptible over a group of donors. For two antibiotics, vancomycin and penicillin G tested at pharmacologic levels, a subset of Gram-positive bacteria was inhibited. A natural product with antibacterial properties, diluted Vaccinium

macrocarpon (cranberry) juice, was shown to inhibit a range of oral taxa, including Alloprevotella sp__HMT_473, Granulicatella adiacens, Lachnoanaerobaculum umeaense, Lepotrichia sp__HMT_215, Peptostreptococcus stomatis, Prevotella nanceiensis, Stomatobaculum sp__HMT_097, Veillonella parvula, and kill some targets.
Conclusions: The model discussed in this study has promise as a rapid, precise, and reproducible ex vivo method to test and identify potential clinically useful antimicrobial agents active against the oral biofilm community.
Approval: IRB Protocol Number 2021-0947
Funding: N/A

34. DENTIN-RESIN INTERFACE STABILITY WITH ACIDIC-PRIMERS CONTAINING PROANTHOCYANIDINS DESIGNERS

José Guilherme Neves, Walleska Feijo Liberato, Shuxi Jing, Chenglei Wang, Shao-Nong Chen, Guido F. Pauli, Ana Bedran-Russo
Department of Oral Biology, UIC College of Dentistry,
Department of Pharmaceutical Sciences, UIC College of Pharmacy

Objectives: Proanthocyanidins are flavonoids explored as multi-functional biomaterials for dental therapies. This study compared the effect of ligand-Proanthocyanidins (PAC) acidic primers on the dentin-resin stability.
Methods: Four PAC-primers (Tetramer ABA, Trimer AB, Trimer AA, and Trimer BB) were produced using a DESIGNER approach and chemical conversion procedures. The dentin-resin Micro-tensile bond strength (TBS) was analyzed on polished dentin surfaces (n=8) and etch-and-rinse bonding procedures (surface etching, 10% PAC priming for 1 min, rinsing, adhesive application, and resin composite build-up). After 24 hs, specimens were sectioned, and TBS measured using a universal testing machine and the fracture pattern analyzed. The viscoelastic properties (storage modulus- E' and damping capacity - Tan δ) of (adhesive layer; hybrid layer (HL) and underlying dentin (n=3) were determined by tribo indenter (Ti980 Hysitron/Bruker) under modulus mapping mode. Settings included frequency of 200 Hz, load amplitude of 2 μN, and 7.5 ms time constant. The analyses were performed in different timepoints: immediate and after 6 months. Data were statistically analyzed using one-way ANOVA and post-hoc tests (α=0.05).
Results: Treatment with PAC-DESIGNER acidic primers significantly increase the TBS (means 45-65 MPa) when compared to control (19 MPa), ($p<0.05$), with no statistically significant differences among PAC primers and timepoints ($p\geq0.05$). PAC-DESIGNER acidic primer groups exhibited higher E' values than the control in the adhesive layer ($p<0.05$). In the HL and underlying dentin, an increase in E' and a decrease in damping capacity were observed for groups etched with PAC-DESIGNER acidic primers compared to the control ($p<0.05$).
Conclusions: PAC-DESIGNER acidic primers offer a promising application by

promoting remarkably stable TBS over time and enhancing the viscoelastic properties of dentin-resin components.
Approval: IRB Protocol Number 2023-0717
Funding: NIH R01 DE028194

35. NANO-ENHANCED ELECTROCHEMICAL APPROACH FOR EFFICIENT ROOT CANAL IRRIGATION

Kaajal Rengaraj, Mareeswari Paramasivan, Govindaraj Perumal, Wei Li, Kari Severson, Qian Xie, Christine D. Wu, Xue-Jun Li, Mathew T. Mathew
RMDR Lab, Department of Biomedical Sciences, UIC College of Medicine, Rockford, IL,
Department of Biomedical Engineering, University of Connecticut Health, Farmington, CT,
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Chemical and Biological Sciences, Rockford University, Rockford, IL,
Department of Endodontics, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Root Canal Treatment (RCT) is an endodontic procedure performed to preserve severely infected tooth to retain its function. The American Association of Endodontists reported in October 2023 that the number of endodontic procedures had increased throughout the previous five years. Approximately 14% of root canal procedures fail because of re-infection, despite the traditional disinfection techniques being effective in the majority of cases. In dentistry, achieving complete disinfection in the root canal area remains a challenge. To successfully eradicate root canal bacteria, we developed a novel irrigation technique by combining electrochemistry and nanotechnology.
Methods: Following treatment of MG-63 (bone sarcoma) cells with varying quantities of zinc oxide nanoparticles (ZnO NPs) for 24 and 72 hours, the alamarBlue assay was used to assess the vitality. The experiment was conducted using Gamry Instruments Framework software and an electrochemical setup. Over a range of time periods (60 s, 120 s, and 180 s), MG-63 cells were exposed to a potential of -5V in two samples: 0.9% saline (control) and 5 µg/mL ZnO NPs in 0.9% saline. The AlamarBlue assay was then used to determine the cell viability. Using the same settings, the experiment was repeated on human gingival fibroblast cells and osteoblasts differentiated from iPSCs. The combined technique was then used to treat E. faecalis planktonic and biofilm cultures, and colony forming units (CFU) plating was utilized to determine the number of viable colonies. Three controls were employed for the treatment of the E. faecalis biofilm culture: the untreated biofilm culture as the control group, electrochemically treated biofilm samples without saline or zinc oxide nanoparticles as the negative control, and 5% sodium hypochlorite as the positive control. E. faecalis biofilm cultures that had been pre-treated and post-treated underwent SEM and TEM

analysis to compare morphological changes. All experiments were done in triplicates.
Results: Based on the results of cell viability tests, 5 µg/mL was determined to be the ideal concentration of ZnO NPs. In MG-63, human gingival fibroblast and osteoblasts differentiated from iPSCs cell lines, above 90% cell viability was demonstrated at 60 s of treatment. Significantly reduced bacterial viability was observed in treatment groups when compared to the non-electrochemically treated groups, indicating effective bacterial eradication. Morphological changes such as cell membrane rupture or cell lysis were observed in SEM and TEM images in all treatment groups when compared with the non-treated bacteria.
Conclusions: This is an ongoing study and further studies are required. This combination approach may be utilized as a substitute or supplement to the existing irrigation methods in order to eradicate about ~99.99% of bacteria, achieving disinfection.
Approval: N/A
Funding: N/A

36. B-TYPE PROANTHOCYANIDINS REDUCE PROTEOLYSIS AND PERMEABILITY OF CARIES-AFFECTED DENTIN-RESIN INTERFACES

Mahmoud Sayed, Shuxi Jing, Shao-Nong Chen, Guido Pauli, Ana Bedran-Russo
Department of Oral Biology, UIC College of Dentistry,
Department of Pharmaceutical Sciences, UIC College of Pharmacy

Objectives: The preservation of collagen matrix integrity is crucial for more durable dentin-resin bonding. This study aimed to explore the potential of dimeric and trimeric B-type proanthocyanidins (PACs) to silence enzymatic activities and enhance sealing at the hybrid layer and underlying dentin in sound and natural caries-affected dentin-resin interfaces (NCAD).
Methods: Standard formulations of B-type dimeric (B) and trimeric (BB) PACs from Theobroma Cacao (TC) were prepared using a DESIGNER approach (Depletion and Enrichment of Select Ingredients Generating Normalized Extract Resources). Dentin specimens were prepared from human molars and divided into two groups based on substrate type (sound dentin and NCAD) and three treatment groups based on the biomodification primer (6.5% TC B (dimer), 6.5% TC BB (trimer), and HEPES primer - control). Bonding procedures utilized etch-and-rinse technique (35% glycolic acid for 15 sec, primer for 1 min, and bonding using experimental dental adhesive). Specimens were sectioned and polished to 500 µm thickness and subsequently prepared for interfacial in-situ zymography, using fluorescein-conjugated gelatin as MMPs substrate) and interfacial micro-permeability using 0.1 M rhodamine-B solution (pH = 7.2). Fluorescent microscopy was utilized for imaging, fluorescence intensity was estimated using Image-J (NIH, USA). Data were analyzed using three-way ANOVA and post-hoc tests (α=0.05).
Results: NCAD substrate showed higher enzymatic activity compared to sound

substrate ($p < 0.001$). Enzymatic activity was significantly higher in sound ($p < 0.001$) and NCAD ($p < 0.001$) control groups than PAC-treated groups which exhibited substantial enzyme-silencing effect. No significant differences were observed between the PAC-treated groups ($p = 1.000$). A similar trend was observed in the interfacial micro-permeability, with PAC-treated groups achieving profound sealing in NCAD, reaching depths up to 60µm.
Conclusions: Dimeric and trimeric B-type PACs were remarkably effective at reduced enzymatic activity and sealing the resin-dentin interface and underlying dentin in sound dentin and NCAD.
Approval: IRB Protocol Number 2023-0717
Funding: NIH R01 DE028194

37. GENE SEQUENCING REVEALS KEY FACTORS MODULATING INFLAMMATORY DPSC DIFFERENTIATION

Sreelekshmi Sreekumar, Muhamad Irfan, Ji Hyun Kim, Seung Chung
Department of Oral Biology, UIC College of Dentistry

Objectives: Reparative dentinogenesis is closely linked to intense inflammation, which triggers the recruitment and differentiation of dental pulp stem cells (DPSCs) into the dentin lineage. Understanding how inflammatory responses influence DPSCs is essential for elucidating the mechanisms underlying dentin and pulp regeneration. Given the limited data on this process, a broad approach is employed here to gain a deeper understanding of the complex mechanisms involved and to identify downstream signaling targets. This study aims to investigate the role of inflammation and the complement receptor C5L2 in the odontoblastic differentiation of DPSCs and the associated transcriptomic changes using poly-A RNA sequencing (RNA-seq).
Methods: RNA-seq was performed by LC Sciences from RNA isolated from DPSCs pallet collected after 7-day treatment with or without TNFα, or siC5L2 between passages 2-4. RNA was isolated using the Qiagen RNeasy Mini Kit (79216 Qiagen, Germantown, MD). In short, a Poly(A) RNA sequencing library was prepared following Illumina's TruSeq-stranded-mRNA sample preparation protocol.
Results: Following inflammatory stimulation, DPSCs exhibit significantly altered gene profiles, including marked upregulation of key odontogenic genes, highlighting the critical role of inflammation in dentinogenesis.
Conclusions: We demonstrate that TNFα-treated, odontoblast-like differentiating DPSCs, under C5L2 modulation, show differentially expressed gene profiles and transcriptomic changes. The data presented may offer new avenues for experimental approaches aimed at uncovering pathways in dentinogenesis by identifying specific transcription factors and gene profiles.
Approval: N/A
Funding: NIH R01 DE029816

38. POTENTIAL MICROBIAL INTERACTIONS BETWEEN CARIOGENIC STREPTOCOCCI IN CLINICALLY RELEVANT MEDIA

Nok Hin Tso, Mohamad Alhadlaq, Kassapa Jayo Bandara Ellepola, Russell Pesavento
Department of Oral Biology, UIC College of Dentistry

Objectives: Streptococcus mutans and Streptococcus sobrinus are two related species often linked to the incidence and severity of early childhood caries (ECC) but, to the best of our knowledge, have never been reported to form mixed assemblages or co-aggregates in vitro. This study aims to investigate these potential microbial interactions between S. mutans and S. sobrinus in a variety of media through a series of in vitro assays that involve their combined biofilm formation capability and their susceptibility to treatment to a known agglutination agent.
Methods: Unstimulated WHS was collected from healthy M/F children aged 6-12, pooled filtered and stored at -80 deg C prior to use. Mucin-containing medium (MCM) was prepared using the literature methods. Chondroitin sulfate A (CSA) was added to a cerium oxide nanoparticles (CeO2-NP, 3-5 nm) dispersion in acidic media to produce CeO2-NP-CSA-B aggregates (agglutination agent) in high yield, stored in sodium bicarbonate and characterized by known methods. Sucrose-based attachment and biofilm inhibition assays were carried out on polystyrene plates in either MCM or BHI. Following literature methods, all experiments were carried out with S. mutans alone, S. sobrinus alone, or an equal volume mixture of both as determined by OD600. Samples were then divided into a control group (no treatment) and a treatment group (e.g., CeO2-NP-CSA-B). Adherent biofilm was assessed via crystal violet (CV) staining after 24h incubation at 37°C with 5% CO2. Sedimentation assays (non-sucrose based) as reported in the literature were performed in both WHS (or MCM) for 2h, and optical density (OD600) was measured every 30 minutes by UV-Vis spectrophotometer.
Results: In MCM, there was a significant increase (approx. 25%) in sucrose dependent biofilm formation in going from single species assays with either S. mutans or S. sobrinus vs mixed species. The same increase was not observed in BHI. In the in vitro sedimentation assay (non-sucrose dependent) in WHS, CeO2-NP-CSA-B significantly cleared S. mutans when present as single species but not S. sobrinus under the same conditions. However, dual-species sedimentation assays carried out with equal volume of S. mutans with S. sobrinus showed a significant reduction in the mixed species treatment group resembling that of S. mutans alone.
Conclusions: Indirect evidence supports both sucrose independent and sucrose dependent mechanism(s) of S. mutans-S. sobrinus interactions in WHS and MCM, but not in BHI. Direct measurement studies (microscopy) are needed to investigate this interaction as well as its potential clinical implications.
Approval: IRB Protocol Number 2023-0562, 2022-0927
Funding: Colgate Award For Research Excellence

39. ROLE OF DMP1-MEDIATED IMMUNOMODULATION DURING OSTEOGENIC DIFFERENTIATION OF PDLSCS

Cassandra Alyssa Villani, Yinghua Chen, Anne George
Department of Oral Biology, UIC College of Dentistry

Objectives: Periodontal ligament stem cells (PDLSCs), when stimulated with Dentin Matrix Protein 1 (DMP1), activates intracellular Ca2+ release from the ER. This results in the translocation of glucose regulatory protein 78 (GRP78) to the plasma membrane where it functions as a receptor to facilitate the internalization of the receptor-ligand complex. Transcriptomic changes indicate an upregulation of immune regulatory pathways in DMP1 stimulated PDLSCs overexpressing GRP78. Therefore, we hypothesize that DMP1 and GRP78 function synergistically to promote osteoblast differentiation of PDLSCs through immunomodulation.
Methods: Control PDLSCs and PDLSCs overexpressing GRP78 (PDLSCs_OEGRP78) were cultured for 48 hours under growth conditions with or without DMP1 stimulation. Bulk RNA-sequencing was performed, and the edgeR package was used to generate differential gene expression profiles for Gene Ontology (GO) pathway enrichment analysis. Immune regulatory pathway genes were validated by qRT-PCR. Immunofluorescence analysis was used to demonstrate localization of GRP78 and DMP1 relative to osteogenic and immunogenic proteins. Alizarin red staining was performed to demonstrate Ca2+ deposition in the matrix and topography examined by scanning electron microscopy (SEM).
Results: GO analysis of control PDLSCs stimulated with DMP1 demonstrated an enrichment of pathways including osteoblast differentiation, myeloid cell differentiation, and regulation of innate immune response. In PDLSCs_OEGRP78, DMP1 stimulation resulted in enrichment of pathways for positive regulation of innate immune response, regulation of hematopoietic stem cell differentiation. RT-PCR validation for control PDLSCs demonstrated a positive association with RNA-sequencing data ($R2 = 0.8711$). SEM and alizarin red staining confirmed osteogenic differentiation of PDLSCs. Immunofluorescent staining indicated temporal and spatial changes of DMP1 and GRP78 on the plasma membrane of PDLSCs and PDLSCs_OEGRP78.
Conclusions: Altered gene expression of immune regulatory pathways during the osteogenic differentiation of PDLSCs may present a new signaling axis mediated by DMP1 binding to GRP78. Transcriptomic shifts resulting from overexpression of GRP78 indicate the immunomodulatory status that DMP1-GRP78 interactions play during osteogenic differentiation of PDLSCs.
Approval: N/A
Funding: NIH R01 DE031737, R01 DE028531, The Brodie Endowment Fund

40. IN VITRO STUDY COMPARING TREATMENTS FOR INCIPIENT ENAMEL LESION REMINERALIZATION

Aliyah I. Wilson, Evelina H. Kratunova, Azza Tagelsir Ahmed, Camila A. Zamperini, Christine D. Wu, Sahar Alrayyes
Department of Pediatric Dentistry, UIC College of Dentistry, Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This study aimed to compare the remineralization efficacy of Icon™, 3M™ Varnish™ 5% Sodium Fluoride White Varnish (FV), and 38% Silver Diamine Fluoride (SDF; Advantage Arrest™) on enamel surfaces affected by incipient caries lesions.
Methods: Caries-free permanent teeth, extracted for orthodontic or surgical purposes, were obtained from the Pediatric Dentistry Department at UIC College of Dentistry. Enamel samples (4 mm x 5 mm) were prepared, frozen, and subjected to baseline Knoop microhardness testing. Samples were randomized into four groups (n=5/group): Icon, FV, SDF, and a control group (no treatment). Artificial caries lesions were induced and treated according to manufacturers' instructions. Specimens were then immersed in a saliva-like remineralization solution for seven days. Post-treatment microhardness was assessed at 20 µm intervals to a depth of 200 µm. Statistical analyses included ANOVA with Tukey-Kramer post hoc tests and Generalized Estimating Equation (GEE) modeling to assess group differences and trends.
Results: SDF demonstrated the lowest microhardness values at all measured depths, with a mean of 147.24 (SD: 39.76) at 100 µm, significantly lower than FV (276.54; SD: 33.72), Icon (254.59; SD: 30.18), and the control (253.19; SD: 36.16). Higher microhardness values observed with FV and Icon suggest superior remineralization and enamel strengthening compared to SDF. ANOVA showed significant differences ($p < 0.0001$) between groups at all depths, with FV and Icon outperforming SDF in microhardness recovery. However, no statistically significant differences were observed between FV and Icon, indicating similar remineralization efficacy. GEE analysis confirmed that while all groups showed increasing trends in microhardness over depth, SDF consistently had the smallest improvements, indicating limited efficacy in improving enamel strength.
Conclusions: When managing incipient caries, all three materials are effective options for addressing early caries lesions. However, FV and Icon provided superior remineralization and surface hardening when compared to SDF.
Approval: IRB Protocol Number 2024-0741
Funding: N/A

41. HOW NEW BLOOD VESSELS COMMUNICATE WITH FIBROBLASTS IN THE HEALING WOUND

Heidi Yuan, Anna Maria Salapatas, Trevor R. Leonardo, Chen Han, Bhavya Vegesna, Mateusz S. Wietecha, Lin Chen, Sriram Ravindran, Luisa Ann DiPietro
Center for Wound Healing and Tissue Regeneration, UIC College of Dentistry, Department of Oral Biology, UIC College of Dentistry

Objectives: An adequate wound healing response requires the coordination of intercellular signals between multiple cell types. During the proliferative and remodeling phases of healing, endothelial cells undergoing angiogenesis and fibroblasts depositing nascent ECM are likely to communicate through the release of endothelial cell-derived extracellular vesicles (ECEVs) that influence fibroblast behavior. Thus, in this study we aimed to investigate the effects of ECEV treatment on fibroblast function both in vitro and in vivo through a murine skin wound healing model.
Methods: ECEVs were isolated from human dermal microvascular endothelial cells. To determine how ECEVs influence the fibroblast transcriptome, dermal fibroblasts were treated in vitro with ECEVs and subsequently underwent bulk RNA sequencing. Enrichment analysis was used to identify key fibroblast functions and pathways affected by ECEV treatment. To validate the transcriptomic shifts, ECEV-treated fibroblasts were evaluated in a series of functional assays, including a proliferation (MTS) assay, cell cycle analysis, scratch wound assay, and collagen contraction assay. The effect of ECEVs on fibroblast ECM deposition was also assessed by immunofluorescent detection of collagens and fibronectin in the cell-derived matrices of ECEV-treated fibroblasts and controls. Lastly, the effect of exogenous ECEVs on murine wound healing was assessed. 5-mm full-thickness excisional wounds were made on the mouse dorsum and injected subcutaneously with ECEVs twice weekly through day 21 post-wounding. Scar tissue was harvested on days 14 and 21 post-wounding for histological examination of collagen and ECM deposition.
Results: Enrichment analysis (GO, Reactome, and IPA) showed that ECEVs influence fibroblast pathways relating to cell division, ECM organization, and fibrosis. This was functionally corroborated with the in vitro assessment of ECEV-treated fibroblasts. Specifically, proliferation, migration, and cell cycle progression was upregulated in fibroblasts treated with ECEVs. ECEV-treated fibroblasts also exhibited a significantly enhanced ability to contract collagen and produced a denser collagen matrix compared to control fibroblasts. Similarly, in vivo treatment of mouse wounds with ECEVs led to an increased density of total collagen in the wound bed of day 14 scars, with a greater ratio of mature to immature collagen in the wound bed. Additionally, the vimentin-positive area was increased as detected by immunofluorescence, suggesting that ECEVs upregulate the quantity of fibroblasts in the wound.
Conclusions: Endothelial cells secrete ECEVs that regulate wound healing-related functions of fibroblasts, such as proliferation, collagen deposition and ECM organization. In contexts beyond wound repair, where angiogenesis and fibrosis are correlated, secretion of ECEVs may be one important mechanism contributing to this relationship.
Approval: ACC Protocol Number 23-155
Funding: NIH R01 GM50875, NIH R35 GM139603, NIH F31 AR083830, NIH F30 DE029689, NIH F31 DE028747, NIH F31 AR082287, NIH R01 DE027404, NIH R01 DE30495

CLINICAL SCIENCES

42. BARRIERS AND FACILITATORS FOR ORTHODONTIC CARE FOR SPECIAL NEEDS CHILDREN

Nourah Abdul Kader, Min Kyeong Lee, Maysaa Oubaidin, Grace Viana, Praveen Gajendrareddy, Veerasathpurush Allareddy
Department of Orthodontics, UIC College of Dentistry,
Department of Periodontics, UIC College of Dentistry

Objectives: Children with special health care needs (CHSCNs) are an underserved population and literature shows that they often face difficulties in accessing dental care. There is little to information on access to orthodontic care for this population. The purpose of this study is to identify barriers and facilitators to providing orthodontic care to children with special health care needs (CHSCNs). We hypothesize that practitioner demographics and practice characteristics are associated with the barriers and facilitators to providing orthodontic care to children with special needs.
Methods: Data was collected through a 30-item survey administered to practicing orthodontists in the state of Illinois capturing data on practitioner demographics, practice characteristics, views about providing orthodontic care to CHSCNs, orthodontist's experience, affiliation with pediatric dentists, and referral practices between providers. Descriptive statistics were calculated using frequency distributions (%). The examination of association between selected survey questions, cross-tabulations were conducted followed by exact Chi-Square tests, (Fisher Exact Test). A statistical significance level of 0.05 was used.
Results: 57 Orthodontists participated in the study. 25% of respondents had additional training in special care dentistry or pediatric dentistry.70% of orthodontists provide routine orthodontics care to CHSCNs. Amongst those that do not routinely provide care, 67% are interested in treating CHSCNs. The types of care provided by Orthodontists for CHSCNs included: oral hygiene (32.8%), maxillary expansion (47.5%), interceptive orthodontics (44.3%), comprehensive orthodontics(44.3%), and radiographs (41%). 87% rated their experience of providing care as Good. Strongest motivators for provision of orthodontic care to CHSCNs are: wanting to help those with special needs and personal connection or experience. Barriers include: communication barriers, patient compliance, and practice set up.
Conclusions: The results showed that practitioner characteristics and practice demographics were associated with the barriers and facilitators to providing orthodontic care to children with special needs. The top rated barrier was patient compliance and the top rated facilitator was desire to help those with special needs. The study also highlighted a critical gap in literature in this area indicating a need for further research to identify the complex needs to increase access to orthodontic care for children with special needs. Further, the findings underscore the necessity for enhanced training and education for orthodontists to treat CHSCNs.
Approval: IRB Protocol Number 2023-0425
Funding: AAOF Research Aid Award

43. IN-VITRO EVALUATION OF ENDOCEM MTA MICROHARDNESS IN PRIMARY MOLAR PULPOTOMIES

Reem Aldosary, Satish Alapati, Majd Alsaleh, Evelina H. Kratunova
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Endodontics, UIC College of Dentistry

Objectives: This study aimed to evaluate the impact of commonly used restorative materials on the microhardness of ENDOCEM MTA (Mineral Trioxide Aggregate) when used in primary molar pulpotomies. Specifically, it assessed whether the type of restorative material placed over ENDOCEM MTA in a single-visit procedure affects its setting reaction and mechanical properties, as measured by microhardness.
Methods: Fifty extracted primary molars were prepared following standardized pulpotomy protocols. A 3mm layer of ENDOCEM MTA was applied to the pulpal floor of each tooth. Teeth were divided into five groups based on the overlying material: control (moistened cotton pellet), resin-modified glass ionomer cement (Fuji II LC), zinc oxide eugenol cement (IRM), Fuji II combined with a stainless-steel crown (SSC), and IRM combined with SSC. Groups with restorative materials were subjected to simulated oral conditions for 24 hours, incubated at 37°C with 100% humidity. After incubation, the teeth were sectioned mesiodistally, polished, and analyzed for microhardness using a Vickers Microhardness Tester at depths of 1mm, 2mm, and 3mm from the MTA-material interface. Statistical analysis, including ANOVA and Tukey post hoc tests, was performed with significance set at $P < 0.05$.
Results: All experimental groups performed as well as or better than the control, confirming the clinical suitability of all tested combinations. Statistically significant differences in Vickers hardness number (VHN) were observed among groups ($P = 0.0009$). The highest microhardness was recorded in the group restored with Fuji II and SSC (Group 4), achieving a mean VHN of 72.66 ± 6.34 at 3mm depth. Group 3 also demonstrated significantly higher VHN than the control group, with a mean value of 68.24 ± 5.97 at 3mm depth. The control group showed the lowest VHN, with a minimum mean of 58.42 ± 11.26 at 1mm depth. Across all groups, no significant differences in microhardness were observed between the measured depths, indicating uniform setting properties throughout the MTA layer.
Conclusions: The choice of restorative material significantly influenced the microhardness of ENDOCEM MTA in primary molar pulpotomies. While all tested combinations were clinically applicable, IRM and Fuji II combined with SSC provided superior outcomes, enhancing the mechanical properties of ENDOCEM MTA. These findings support the use of ENDOCEM MTA with immediate restoration in single visit pulpotomies, improving both efficiency and outcomes in pediatric dentistry.
Approval: IRB Protocol Number 2024-0667
Funding: N/A

44. PILOT STUDY EXPLORING COMMON FACTORS AMONG UNFAVORABLY PROGNOSED TEETH

Kendah Alzalam, Morvarid Sadri
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Teeth classified with an unfavorable prognosis, whether due to severe periodontal involvement or extensive carious decay, are often recommended for extraction and replacement by dental experts. However, many patients desire to retain their teeth for as long as possible due to financial, esthetic or psychological benefits. There is not enough research that studies the long-term outcome of retaining teeth with an unfavorable prognosis. The objective of this pilot study is to identify any common factors that may exist across a subset of data that contributes to the unexpected long term retention of teeth clinically classified with an "unfavorable prognosis". The patients analyzed in this study chose to preserve teeth that would have otherwise been extracted due to poor prognosis caused by carious decay or periodontal disease.
Methods: The data for seven de-identified patients from Dr. Sadri's dental clinic was collected in order to initiate this study. The data was collected from the patients' initial exams until their most recent visit. The data was analyzed to recognize any factors that may have contributed to the long term retention of the patients' teeth. The factors observed include x-rays, the appointment type and frequency, any periodontal involvement, as well as other details.
Results: The results show all seven patients had periodontal involvement and varying degrees of bone loss evident on the x-rays observed. In order to calculate the appointment frequency, the number of dental visits for periodic oral evaluations (POE) and cleanings (SRP, prophylaxis and periodontal maintenance) were added starting from the patient's first appointment (comprehensive oral exam) until the last cleaning or POE. The number of total visits was then divided by the total years the patient has been attending for cleanings and exams. The calculated number shows the average annual visits for POEs and cleanings. The average annual visits ranged from 0.53 to 1.13 POE and cleaning visits per every year. The appointment types, aside from examinations and routine cleanings included endodontics and restorative treatments. The number of these visits varied from 9 to 29 visits between the seven patients. The unfavorably prognosed teeth of the seven patients were retained ranging from 7 years to 22 years, with some still currently maintained.
Conclusions: Most patients had promising tooth retention rates even with conditions including periodontal disease and dental decay, however the definitive factors have yet to be clear. Further research is required to fully understand the specific cause behind prolonged tooth retention despite the poor prognosis.
Approval: IRB Protocol Number 2024-1132
Funding: N/A

45. PERIODONTITIS-INDUCED MIR-451 REGULATES MACROPHAGE POLARIZATION AND FUNCTION

Kreena Amin, Jack Richard Maddalozzo, Raza Ali Naqvi, Kristelle Capistrano, Araceli Valverde, Shaoping Zhang, Mary Pettiette, Antonio Moretti, Salvador Nares, Afsar Naqvi

Department of Periodontics, UIC College of Dentistry,
Department of Periodontics, College of Dentistry, University of Iowa, Iowa City, Iowa,
Department of Endodontics, School of Dentistry, Virginia Commonwealth University, Richmond, Virginia,
Department of Periodontology, School of Dentistry, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

Objectives: Periodontitis (PD) is a microbial-induced, chronic inflammatory disease characterized by an overt immune activity leading to alveolar bone loss. While significant progress has been made in elucidating the mechanisms associated with periodontal inflammation, very little is known regarding the epigenetic pathways in the pathobiology of PD. Here we aim to identify PD-associated microRNAs (miRNAs), a class of small noncoding RNAs, that may regulate periodontal immunity by investigating their role in shaping macrophage polarization and immune activity.
Methods: In this split-mouth study, participants with chronic periodontitis (CP; n=8) had 1-2 mm2 of soft tissue sample removed from the tooth with >4 mm pocket depth. From the same participants, a second sample of the identical size gingival biopsy was collected from a clinically healthy site (n=9). Total RNA isolated from the samples was examined for miRNA profiles using miRNA microarray. Expression of transcripts was quantified by RT-qPCR. Global pathway and gene target analysis was performed using Ingenuity Pathways Analysis (IPA). Macrophages were transfected with miR-451 or control mimics and the impact on polarization markers and bacterial phagocytosis was assessed by flow cytometry and florescence imaging. Dual luciferase assays were performed in HEK293 cells co-transfected with plasmids cloned with 3'UTRs of different M2 marker genes and miR-451 mimic.
Results: We identified eighty-five differentially expressed miRNAs (64 up- and 21 down-regulated; Fold change: -1.5 to 1.5; $p<0.05$) in inflamed gingiva compared to healthy tissue. Dysregulated miRNAs in PD target genes involved in various biological pathways including JAK/STAT and p38 MAPK signaling suggesting their role in inflammation and immunity. In both pathways, multiple genes were targeted by an upregulated miR-451, a previously uncharacterized miRNA in PD pathobiology. Overexpression of miR-451 skewed macrophage towards pro-inflammatory M1 phenotype by suppressing M2 maker (CD206) and upregulating M1 marker (HLA-DR) indicating a pro-inflammatory role of miR-451 in PD. This correlates with increased expression of inflammatory markers genes (IL-6, MMP8, MMP13, and TNF-α) in periopathogen-challenged macrophages. We demonstrated that miR-451 directly interact with the 3'UTR sequences on multiple M2 markers supporting its role in

macrophage polarization. Importantly, miR-451 transfected macrophages challenged with rhodamine-conjugated E. coli exhibit attenuated phagocytosis suggesting impaired bacterial uptake and clearance.
Conclusions: Inflamed gingiva displays dysregulated miRNA profiles including induction of miR-451, which may impair macrophage plasticity and innate immune function.
Approval: IRB Protocol Number 13-1279
Funding: NIH R01 DE027980, NIH R21 DE026259, NIH R03 DE027147, NIH R01 EY033622

46. BRUSH BIOPSY MIRNA CLASSIFIER FOR OSCC DIAGNOSIS

Dhruvi K. Bhayani, Samira Cheruku, Ashleigh Weyh, Nicholas Callahan, Antonia Kolokythas, Guy R. Adami, Mary Beth Miloro
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry, Department of Oral and Maxillofacial Surgery, UIC College of Dentistry, Department of Oral and Maxillofacial Surgery, Vanderbilt University, Nashville, TN

Objectives: RNA-based diagnosis and prognostic methods for oral squamous cell carcinoma (OSCC) has been slow to transition into clinical practice. Early diagnosis of OSCC Is crucial for improving patient outcomes. An Initial pilot study demonstrated 87% accuracy in differentiating OSCC from control samples collected by a single clinician; however current diagnostic techniques with 90% accuracy requires a referral to an oral surgeon for a scalpel biopsy and histopathology. A noninvasive yet precise method of detecting OSCC is therefore essential. The overlapping clinical features of benign and malignant oral lesions pose a diagnostic challenge, as dentists often focus on dental care and are not trained to perform surgical mucosal biopsies to detect potential malignancies. This can allow serious conditions to go undetected until later stages.
Methods: Brush biopsy samples were collected from patients with confirmed OLP and OSCC by five clinicians. Total RNA was extracted and analyzed for miRNA expression using polyadenylation RT-PCR over a panel of 360 miRNAs. Differential expression analysis was performed to identify miRNAs associated with each condition.
Results: An initial set of 10 miRNAs was identified as differentially expressed between OLP and OSCC in samples from 12 patients collected by five clinicians. Ongoing analysis includes miRNA profiling of a validation set of 15 OLP and 15 OSCC samples to assess the reproducibility and consistency of the identified miRNA profiles across a pool of samples collected by multiple clinicians.
Conclusions: Preliminary findings indicate the potential utility of these miRNAs as biomarkers for differentiating OLP and OSCC. The results will inform the development of a machine learning-based classifier for OSCC, supporting a non-invasive diagnostic approach to improve early detection and patient outcomes.
Approval: IRB Protocol Number 2007-0873
Funding: Pilot grant from the UIC Center for Clinical and Translational Science

47. DOES TEMPOROMANDIBULAR JOINT ARTHROSCOPIC DISCOPEXY IMPROVE OUTCOMES IN PATIENTS WITH EARLY DISC PERFORATIONS?

Caleb Braun, Patrick Louis
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry, Department of Oral and Maxillofacial Surgery, UAB School of Dentistry, Birmingham, AL

Objectives: There is limited current data to guide surgical decision making when performing arthroscopic surgery of the temporomandibular joint (TMJ). In cases of severe joint degeneration, the articular disc is typically laser debrided or posteriorly suture plicated. The purpose of this study is to determine if Class V Bronstein Merrill internal derangement patients benefit from posterior suture plication when adequate discal tissue is present.
Methods: A retrospective case series was performed at one institution following Class V Bronstein Merrill patients that underwent unilateral TMJ arthroscopy by the same surgeon. Inclusion criteria for this study were individuals with an internal derangement that underwent arthroscopic surgery, were diagnosed as Bronstein Merrill Stage V during the procedure, and had documented preoperative and postoperative visual analog pain scores and maximal incisor opening (MIO) measurements. The individuals included were followed for 10 months or more from preoperative medical management to final follow-up. Exclusion criteria included individuals that had undergone arthroscopic surgery and were diagnosed with Bronstein Merrill Stages I-IV, inadequate documentation of analog pain scores or MIOs, inadequate follow-up, systemic arthropathies or a history of head and neck radiation in the maxillofacial region. Eligible subjects were identified through a database search of electronic medical records over a 10-year period. Clinical and surgical variables were determined from an extensive review of the medical record of each subject.
Results: Over a 10-year period, 52 patients were classified as Bronstein Merrill Class V and underwent arthroscopic repair for anterior disc displacement (ADD), with 17 receiving posterior suture plication and 35 undergoing laser debridement without suture plication.
Conclusions: No statistically significant differences in post operative pain, MIOs, American Association of Oral and Maxillofacial Surgeons (AAOMS) defined success rate, failure rate, or time to failure were observed. The data from this study indicates Bronstein Merrill Class V TMJ arthroscopy patients do not derive more benefit from posterior sutures when there is adequate articular disc tissue to allow for plication.
Approval: IRB Protocol Number 080516004
Funding: N/A

48. AGE-ASSOCIATED DIFFERENTIAL SALIVARY IMMUNE PROFILES IN POST-NON-SURGICAL PERIODONTAL THERAPY SUBJECTS

Kristofer R. Ceredon, Raza Ali Naqvi, Matthew Tokarski, Sara Ibrahim, Joseph Gluck, Joel Schwartz, Salvador Nares, Afsar Naqvi
Department of Periodontics, UIC College of Dentistry,
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: Aging Periodontal Disease (PD) patients are at a higher risk of disease progression due to age-related inflammatory dysregulation that may exacerbate PD. Limited evidence exists regarding the efficacy of routine periodontal therapies in geriatric patients. Therefore, understanding immune pathways that contribute to inflammation and its resolution in elderly PD subjects will advance our knowledge on how aging may affect outcomes of periodontal therapy. The purpose of this study is to dissect mechanisms of immune perturbation in geriatric and young-middle age PD patients before and after non-surgical periodontal therapy (NSPT, scaling and root planing).
Methods: This ex-vivo, case-control study focused on salivary and GCF immune profiling in young-middle age (YMA; 20-64 y) and geriatric (G; ≥65 y) human subjects before and after NSPT (n=7/group; Fig. 1). Periodontally healthy (n=7) samples from age- and gender-matched controls were collected from subjects presenting for crown lengthening procedures. Clinical parameters include probing depth (PD), clinical attachment loss (CAL), bleeding on probing (BOP), & plaque index (PI) were measured pre- & post-NSPT. Salivary immune cells were evaluated for flow cytometry and GCF cytokines were quantified by multiplex.
Results: Our results show significant reduction in the clinical parameters post-NSPT in both YMA and G groups compared to healthy controls (Table 1). Compared to YMA subjects, we noticed higher BOP ($p<0.001$) and PI (0.05) in G group post-NSPT, at the re-evaluation appointment; however, no significant differences were observed for mean PPD and CAL values (Table 1). We next assessed the cellular and molecular immune mediators to dissect the impaired or delayed resolution process in elderly patients. Salivary myeloid (neutrophils) and lymphoid (T cells) cells in YMA and G PD subjects showed significantly higher neutrophils (CD11b+CD66+), Th1 (CD4+IFNγ+), and Th17 (CD4+IL17+) cells in PD subjects, compared to controls. Post-NSPT YMA PD subjects exhibit significantly reduced levels of neutrophils, Th1, and Th17 correlating with reduction in clinical parameters (Fig. 2). In G post-NSPT PD subjects, immune cell numbers were also reduced compared to pre-NSPT; however, Th1 and Th17 were significantly higher compared to YMA post-NSPT indicating age-related differences in PD resolution. GCF periotron readings showed consistent reduction in most of the YMA post-NSPT subjects, but G post-NSPT group showed relatively less reduction in GCF levels, and few were non-responders. Finally, G post-NSPT GCF showed higher inflammatory cytokines (IL-8 and IL1a) compared to YMA post-NSPT group further support our clinical and cellular immune profiling (Fig. 3).
Conclusions: Our data suggests a correlation between age and elevation of

inflammatory markers before and after nonsurgical periodontal therapy which may negatively impact capacity to resolve inflammation in periodontal tissues in geriatric patients.
Approval: IRB Protocol Number 2016-0696
Funding: NIH R01 DE027980, NIH R21 DE026259

49. PROVIDER REPORTED INFLUENCES IN DELIVERING INTERCEPTIVE ORTHODONTICS

Neil Singh Chandok, Maysaa Oubaidin, Grace Viana, Min Kyeong Lee, Veersathpurush Allareddy
Department of Orthodontics, UIC College of Dentistry

Objectives: Determine the confidence dentists & orthodontists face in diagnosing, treatment planning and delivering early, interceptive orthodontic treatment, and to identify the impediments dentists and orthodontists face in providing early, interceptive orthodontic treatment.
Methods: Data for this report was collected through an anonymous survey that was administered to oral health providers (dentists and dental specialists). The data was then analyzed using statistical methods. Chi-square tests were employed to assess the statistical significance of these relationships, with a significance level of 0.05. All statistical analyses were performed using IBM SPSS.
Results: Statistical analysis is currently underway. If the findings support our hypothesis, we expect to see a statistically significant association between confidence and a lack of delivering interceptive orthodontic care as. We would also expect that confidence and prior education would be a limiting factor in delivering interceptive orthodontic treatment if there is a statistical correlation.
Conclusions: These results have the potential to support a call for increased learning opportunities to be integrated into dental school curriculum. Further, the inclusion of responses from respondents will help gauge the level of knowledge orthodontists and dentists have in delivering interceptive orthodontic treatment.
Approval: IRB Protocol Number 2024-0490
Funding: N/A

50. RADIOGRAPHIC OUTCOMES OF NS-RCT IN PATIENTS USING ANTIRESORPTIVE/ANTIANGIOGENIC MEDICATIONS

Minwoo Choi, Wanrong Ruan, John Kim, Bradford Johnson, Qian Xie
Department of Endodontics, UIC College of Dentistry

Objectives: The purpose of this study is to investigate the influence of anti-resorptive and anti-angiogenic medications in the radiographic healing outcomes of initial non-surgical root canal treatment. The hypothesis is that patients taking anti-resorptive or

anti-angiogenic medications will exhibit different radiographic healing outcomes in response to initial non-surgical root canal treatment.
Methods: In this retrospective cohort study, the dental records of all patients who received initial non-surgical root canal therapy (NS-RCT) at the UIC College of Dentistry from 2005-2020 were retrieved using an electronic database search on Axium. This data was then filtered using the following inclusion and exclusion criteria: no history of radiation therapy to the head and neck region, no history of retreatment or apical surgery, and a minimum of one-year follow-ups with periapical radiographs. From this population, the treatment group included all patients who had a history of taking anti-resorptive and/or anti-angiogenic medications at the time of NS-RCT. The control group was then randomly selected from this population to match the size of the treatment group, only including patients who did not take anti-resorptive or anti-angiogenic medications at the time of or prior to NS-RCT. Two calibrated board-certified endodontists graded the periapical radiographs from the time of NS-RCT, 1-year follow-up, and longest follow-up using modified periapical index (PAI) scores. Teeth were considered as "healed" (PAI score ≤2 at follow-up), "healing" (PAI score decreased but ≥3 at follow-up), or "non-healing" (PAI score increased and ≥3 at follow-up). "Healed" and "healing" cases were considered as successful, while "non-healing" cases were considered as failed. The data was analyzed with two-tailed independent descriptive analysis using SPSS.
Results: At 1-year follow-ups, the control group had a 92.5% success rate and the exposure group had a 91.8% success rate. At multi-year follow-ups, the control group had a 86.7% success rate and the exposure group had a 86.6% success rate. There was no statistically significant difference between the groups at 1-year follow-ups. Statistical analysis was not performed on multi-year follow-ups due to a heterogeneous data set.
Conclusions: Anti-resorptive and anti-angiogenic medications do not influence the radiographic healing outcomes of initial non-surgical root canal treatment.
Approval: IRB Protocol Number 2022-1547
Funding: UIC College of Dentistry Department of Endodontics

51. AI-BASED CEPHALOMETRIC LANDMARK DETECTION VIA DEEP LEARNING NETWORKS EVALUATION

Evan Chwa, Budi Kusnoto, Mohammed Elnagar, Grace Viana, Fatemeh S. Afshari, Flavio Sanchez
Department of Orthodontics, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This study evaluates the accuracy and reliability of AI-driven cephalometric landmark detection using the proprietary AI system DR ANNIE™ (Data Research Artificial Neural Network Intelligence Expert, USPTO trademark Reg. No. 6,828,401). Developed by the Foundation of Modern Bioprogressive Orthodontic (FMBO), the system's performance is benchmarked against manual tracing conducted

by experienced and calibrated orthodontists. Despite the availability of extensive cephalometric datasets, such as the AAOF Legacy Collection, a significant portion of data remains undigitized, limiting evidence-based research. This study seeks to establish a more efficient and accessible tool for treatment planning and to enhance patient care by expanding the use of craniofacial measurements. Two hypotheses are tested: (1) DR ANNIE™ will demonstrate no significant difference in landmark identification accuracy compared to orthodontists, using a deidentified dataset of 100 cephs from UIC; and (2) there will be no significant difference in cephalometric measurements between the AI system and orthodontists. The results aim to validate AI as a dependable tool for orthodontic diagnostics.

Methods: The dataset consists of 100 deidentified cephs from UIC. Digital images without pre-marked landmarks were provided to an expert orthodontist, who manually identified and digitized the landmarks following inter- and intra-reliability calibration. For inter-reliability, the PI traced the cephs twice using Dolphin Imaging with the resulting coordinates extracted and analyzed in Excel. For intra-reliability, an expert orthodontic faculty member traced the same images. The study achieved Intraclass Correlation Coefficients of approximately 0.80, indicating good reliability. These manually traced landmarks formed the Manually Detected Landmarks group, which served as the control. Separately, the same cephalograms were processed through DR ANNIE™, which automatically identified the landmarks, creating the Auto-Detected Landmarks group. Cartesian coordinates from both groups, along with nine Ricketts Analysis measurements, were exported for statistical analysis using SPSS™ 29.

Results: The results are preliminary. A total of 21 landmarks were analyzed, along with 13 linear and 18 angular measurements from the Ricketts analysis. The mean average error (MAE) for the landmark coordinates is 4.44 mm, with an overall standard deviation of 2.5 mm. For linear measurements, the MAE is 1.10 mm with a standard deviation of 1.02 mm, while angular measurements show an MAE of 1.44° and a standard deviation of 0.93°.

Conclusions: As more data is collected, we expect both the MAE and standard deviation for linear and angular measurements to decrease. At present, the diagnostic quality of AI-driven cephalometric measurements produced by DR ANNIE shows promise, as the current data suggests its accuracy falls within the range of human error observed in a 2023 study by Hwang et al.

Approval: IRB Protocol Number 2024-0728

Funding: N/A

52. HOW DOES SOCIAL MEDIA INFLUENCE PATIENT CHOICE OF SURGEON?

Kai Codner, Begum Elbir, Michael Miloro

Department of Oral and Maxillofacial Surgery, UIC College of Dentistry, Department of Oral and Maxillofacial Surgery, Istanbul Medipol University, Istanbul, Turkey

Objectives: With the increasing influence of social media, it now serves as a tool of communication and research among patients in the field of oral and maxillofacial surgery. Its effect on patients' decisions to undergo maxillofacial surgery has been studied, but the question of whether patients are influenced by social media during the process of choosing their surgeon remains unanswered. This study aims to evaluate the influence of social media on patient choice of oral and maxillofacial surgeon.
Methods: This cross-sectional study used a self-administered online survey to form an anonymous cohort of volunteer participants. This cohort consisted of patients who underwent or are planning to have total temporomandibular joint replacement (TJR) surgery. The questionnaire included 10 questions regarding participants' demographic data, frequency of social media use, and factors affecting their choice of oral and maxillofacial surgeon.
Results: A total of 211 subjects, of which majority (94.8%) were female, participated in the survey. Most participants did not choose their surgeon through social media (66.4%). Of those who did choose their surgeon based on social media, the two most important contributors to their choice were the reported academic information on the surgeon's social media account and surgeon posts showing successful patient outcomes. Surgeons' social media presence (followers/size of platform), and surgeon positive reviews did not demonstrate a significant impact on selection. There was no statistically significant relationship between choosing a surgeon through social media research and overall patient satisfaction.
Conclusions: Social media does play a role in patient choice of surgeon; however, despite its growing presence, it may not be the primary factor in decision-making for many patients. For these reasons, maxillofacial surgeons should consider the influence of social media platforms to educate and attract patients with careful attention to not use the platforms for inappropriate practice marketing in addition to also focusing on building trust through other more traditional channels.
Approval: IRB Protocol Number 2024-0669
Funding: N/A

53. COMPARISON OF HORIZONTAL VERSUS VERTICAL TRACHEOSTOMY INCISION ON SCAR COSMESIS

Emilie Grodman, Osman Khan, Maria Karras, Nicholas Callahan, Ashleigh Weyh
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: Tracheostomy is one of the more commonly performed procedures amongst head and neck surgeons particularly for patients undergoing surgical resection of benign and malignant disease or trauma reconstruction of the head and neck. Postoperative scarring is one of the unfortunate sequelae of the procedure which can have implications not only on patient satisfaction but also quality of life. It is important to consider the cosmetic satisfaction of patients who have undergone tracheostomy and evaluate any subjective associated symptoms. At present, literature lacks any well-defined analysis of cosmetic outcomes between horizontal versus vertical

tracheostomy creation. The goal of this study is to evaluate scar satisfaction, including both subjective cosmesis and symptomatology of patients in addition to objective scar evaluation between vertical and horizontal tracheostomy incision to help guide surgeons and improve patient outcomes.
Methods: This retrospective cohort study examined patients who have undergone tracheostomy creation at the University of Illinois hospital, a high-volume treatment center. Adult patients (>18 years old), with a history of tracheostomy creation performed between 12/1/2020 to 12/1/2024 were included in the study. The POSAS survey, a reliable and validated scar assessment scale that measures scar quality and symptoms was collected for the patient perspective, completed at 6 months post operatively. The observer assessment was performed using the validated SCAR scale by a single board certified facial cosmetic surgeon who was blinded to incision type.
Results: The POSAS scores between patients' and observer varied significantly. Overall, patients' survey results revealed more satisfaction with cosmesis as compared to the survey results of the Facial Cosmetic surgeon. The patient scale revealed no pain or itching at the tracheostomy scar and there was no difference between the horizontal or vertical tracheostomy groups.
Conclusions: In the tracheostomy scar assessment in head and neck patients who have undergone vertical versus horizontal tracheostomy creation, the POSAS patient scale revealed no difference in pain or itching among patients. There was a low correlation between the observer's SCAR survey results compared to the patients' POSAS survey results. This difference is likely related to the increased sensitivity to cosmesis as the observer was a facial cosmetic surgeon. Both horizontal and vertical tracheostomy incisions have equal cosmetic outcomes from a patient perspective and are equally acceptable.
Approval: IRB Protocol Number 2024-1417
Funding: N/A

54. EVALUATING AGREEMENT IN PEDIATRIC AIRWAY ASSESSMENTS ACROSS PROFESSIONAL GROUPS

Nadia Khan, Carmen Simion, Sahar Alrayyes, Christine D. Wu, Evelina H. Kratunova
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Anesthesiology, UIC College of Medicine

Objectives: This study aimed to evaluate agreement in pediatric airway assessments among pediatric dental residents, dental faculty, and anesthesiology faculty. It examined inter- and intra-rater agreement in using the Brodsky classification for tonsillar obstruction, the Mallampati scale for oropharyngeal visibility, and sedation decision-making. It also sought to identify areas needing further training and standardization.
Methods: This cross-sectional observational study included 50 participants: 10 first-year and 12 second-year pediatric dental residents, 15 pediatric dental faculty, and 13

anesthesiology faculty. Participants assessed 17 pediatric oral airway videos using the Brodsky classification, the Mallampati scale, and binary sedation decisions. A second identical survey was administered two weeks later to measure intra-rater agreement. Inter- and intra-rater agreement were analyzed using Kendall's W, Intraclass Correlation Coefficient (ICC), and Fleiss' Kappa. Differences between groups were assessed using Kruskal-Wallis and Wilcoxon rank-sum tests.
Results: The Brodsky classification showed moderate to high inter-rater agreement, with anesthesiology faculty achieving the highest levels (ICC = 0.627–0.612). Dental faculty improved between surveys (ICC = 0.587 to 0.654), while residents maintained moderate agreement (ICC = 0.578–0.536). The Mallampati scale had lower inter-rater agreement, with anesthesiology faculty declining from moderate agreement (ICC = 0.365) in the first survey to lower agreement in the second (ICC = 0.209). Sedation decisions had moderate agreement, with Fleiss' Kappa scores of 0.467 for anesthesiology and 0.407 for dental faculty. Intra-rater agreement was highest among anesthesiology faculty (mean = 15.6, SD = 2.07), followed by dental faculty (mean = 14.62, SD = 1.98) and residents (mean = 13.05, SD = 2.24). Group differences were significant ($p = 0.009$). Post hoc analysis showed anesthesiology faculty were significantly more consistent than residents and marginally better than dental faculty in Brodsky and sedation assessments, while consistent use of the Mallampati scale was challenging across all groups.
Conclusions: Variability in agreement across professional groups was observed. The Brodsky classification demonstrated higher levels of agreement, particularly among experienced clinicians, supporting its utility. The Mallampati scale showed lower agreement, underlining challenges related to subjectivity and patient cooperation. These findings show the need for better calibration and educational interventions to ensure more consistent pediatric airway management practices.
Approval: IRB Protocol Number 2024-0592
Funding: N/A

55. IS THE SUBMENTAL ISLAND FLAP BENEFICIAL IN PALLIATIVE MANDIBULAR RESECTION?

Osman Khan, Sarah Loren Moles, Ashleigh Weyh, Nicholas Callahan
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: To show that the addition of the submental island flap does not significantly increase surgical time or morbidity, and decreases the incidence of post-operative complications including hardware exposure and oral-cutaneous fistulas.
Methods: A retrospective review of 6 patients with contraindications to formal bony reconstructions, who underwent a palliative resection of the mandible, reconstruction with a titanium reconstruction plate, and a submental island flap. Surgical time, flap viability, length of stay, the incidence of postoperative oral-cutaneous fistula, and postoperative complications were collected. Additional data points collected were

pathological diagnosis, resulting pathologic fractures, past medical and surgical history, incidence of head & neck cancer, number and type of additional operating room procedures after initial surgery, contraindications to free flap, post-operative follow-up period, and use of chronic antibiotics.
Results: The mean age of the patients was 58 +/- 15.4 years, and all six were males. The etiology of the mandibular pathology was two subjects with osteoradionecrosis, two with osteomyelitis, one with medication-related osteonecrosis of the jaw, one with multiple myeloma, and five of the six presented with a pathologic fracture. All six submental island flaps survived without intraoral wound breakdown. The average length of stay was 4.8 days, and the average operating room time was 292 minutes. Only one of the subjects required short-term nasal feeding tube placement for post-operative nutrition, due to aspiration risk, while the remaining five patients returned to normal swallowing prior to discharge. One out of six patients developed exposure of hardware and oral-cutaneous fistula formation, four patients had progression of their mandibular disease, and two patients passed from their disease. One patient had a small donor site dehiscence, which was treated with local wound care, and one patient had hardware failure due to progression of disease.
Conclusions: The submental island is a valuable tool that can safely augment palliative resections, especially in patients with contraindications to free flap reconstruction. This technique allows for intraoral soft tissue augmentation and decreases postoperative complications even in the case of disease progression.
Approval: IRB Protocol Number 2024-1374
Funding: N/A

56. MATERNAL FACTORS AND BIRTH DELIVERY IMPACT ON EARLY CHILDHOOD CARIES

Ines Lau, Leda Mugayar, Scott Tomar, Sobia Bilal, Khatija Noorullah, Majd Alsaleh
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: To assess differences in Severe Early Childhood Caries (SECC) rates based on maternal illness during pregnancy, pregnancy term (preterm vs. full term), and delivery method (cesarean section vs. vaginal delivery). The study aims to identify potential birth-related risk factors contributing to SECC in pediatric patients.
Methods: The study was approved by the Institutional Review Board and conducted at the University of Illinois Chicago (UIC) pediatric dentistry department. This retrospective cohort study reviewed patient charts from the Infant Oral Health (IOH) Clinic at UIC's pediatric dentistry department. Patient data collected from the axiUm® electronic health records system between August 1, 2021, and August 31, 2023, included children aged 0 to 3 years, with oral health outcomes assessed using dmfs (decayed, missing, and filled surfaces) scores and dmft (decayed, missing, and filled teeth) scores. A total of 521 out of 801 eligible mother-child pairs met the predefined inclusion criteria. The data were analyzed using descriptive statistics, the

Kruskal-Wallis test, Fisher's Exact Test, and regression analysis to evaluate potential associations between birth-related factors and dmfs SECC rate.
Results: The mean age of children in the study was 21.4 months, with a median dmft score of 5 and a median dmfs score of 0.1. Based on dmfs score categories, 28.8% of children fell into the low category (0.0 - 0.01), 12.1% in the medium category (0.01 - 0.06), and 59.1% in the high category (>0.06). Regarding maternal health during pregnancy, 79.5% of the mothers were healthy during pregnancy, while 20.5% ill. For birth term, 86.8% were full term, with 13.2% preterm. For delivery method, 74.4% were vaginal delivery, while 25.6% were cesarean sections. Statistical analysis showed that maternal health status during pregnancy was significantly associated with SECC, ($p=0.031$ for dmft score and $p=0.042$ for dmfs score). Neither pregnancy term ($p=0.666$ for dmft score and $p=0.650$ for dmfs score) nor mode of delivery ($p=0.091$ for dmft score and $p=0.076$ for dmfs score) were significantly associated with the rates of Severe Early Childhood Caries (SECC).
Conclusions: The results of this study indicate that maternal health factors during pregnancy play a more significant role in the development of Severe Early Childhood Caries (SECC) compared to birth-related factors such as pregnancy term or delivery method.
Approval: IRB Protocol Number 2023-0609
Funding: N/A

57. ASSESSMENT OF BRAVA SYSTEM TO ACHIEVE PREDICTED ORTHODONTIC OUTCOMES

John Lorenz, Grace Viana, Phimon Atsawasuwan, Mohammed Elnagar
Department of Orthodontics, UIC College of Dentistry

Objectives: Brius Technologies has developed the Brava Independent Mover System, a novel orthodontic appliance designed to enhance treatment efficiency, function, and aesthetics. This system uses lingualized brackets connected to NiTi arms to move teeth both independently and simultaneously. This study assesses the Brava system's precision in achieving predicted orthodontic outcomes for maxillary and mandibular treatment. Using the American Board of Orthodontics Objective Grading System (ABO-OGS), we assess the discrepancy index (DI) and cast-radiograph evaluation (CRE) through analysis of digital .stl files. We test the hypothesis that Brava is an effective system for achieving predicted tooth movement outcomes.
Methods: This retrospective study examines a cohort of 30 subjects treated by a single orthodontist across two private practice locations in Dallas, Texas. Inclusion criteria includes treatment with the Brava system on both arches, complete permanent dentition (excluding third molars), non-extraction treatment, upper or lower crowding less than 10mm, complete records, and dental crowns of suitable height and shape. Digital .stl files of pre-treatment (T0), post-treatment (T1), and virtually simulated treatment outcomes (TV) were analyzed. The TV models were generated using the

proprietary Brius Planning Software and graded virtually using the ABO-OGS to determine DI and CRE scores via the MotionView Ortho Share 3D Software. Intraclass correlation coefficients were calculated for intra- and inter-provider reliability on 20% of the sample.
Results: Pending (expected January 2025).
Conclusion: Pending.
Approval: IRB Protocol Number 2023-0870
Funding: Dr. Allan G. Brodie Scholarship

58. STUDENTS UTILIZE PROCEDURAL REFLECTION TO SOLVE PROBLEMS AND IMPROVE OUTCOMES

Jack Richard Maddalozzo, Gavin Hage, Priscilla Chang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives:
-Qualitatively assess procedural reflections through the analysis of themes and patterns in critical reasoning, problem solving strategies and self-awareness.
-Determine if student perceptions of identifying deficiencies, troubleshooting, and completing corrections impact performance outcomes.
The hypothesis is that subjects who utilize procedural reflections to identify deficiencies, create an action plan and implement corrections demonstrate enhanced perception and critical-thinking skills in clinical decision-making leading to improved performance outcomes.
Methods: First year dental students completed procedural reflections and photography assignments based on waxing a full crown restoration on crown #3. Assignments were evaluated and graded by faculty. After the semester had ended, consenting subjects were de-identified and analysis occurred. Thematic content analysis with a constant comparative approach was used and consensus achieved by three reviewers to identify themes and patterns in critical reasoning, problem solving strategies and self-awareness. An independent sample t-test was conducted comparing waxing scores of subjects who identified deficiencies in their procedural reflections and completed corrections versus scores of subjects who identified deficiencies and did not complete corrections.
Results: All subjects (n=20) described deficiencies and strategically described corrections throughout their waxing process. There was a significant difference in mean waxing scores for subjects who identified a deficiency and completed corrections (M=89.9, SD=4.5) compared to those who identified a deficiency and did not complete corrections (M=81.8, SD=9.9); $t(18)=2.16$, $p=.03$. Students who identified deficiencies and corrected them scored 8.1% higher on their waxing assignment on average.
Conclusions: Procedural reflections support dental student skill development and decision-making. All students in the study demonstrated ability to identify deficiencies and describe corrections; those who elected to complete corrections achieved

significantly higher performance outcomes compared to those who did not. Increased critical-thinking and the decision to implement problem-solving strategies may indicate developing maturity with clinical decision-making.
Approval: IRB Protocol Number 2023-1101
Funding: N/A

59. AUTOMATED CLASSIFICATION OF MIDPALATAL SUTURE MATURATION STAGES FROM CBCT

Lauren Mills, Amanda Nikho, Omid Halimi Milani, Marouane Tliba, Rashid Ansari, Ahmet Enis Cetin, Mohammed Elnagar
Department of Orthodontics, UIC College of Dentistry,
Department of Electrical and Computer Engineering, UIC College of Engineering

Objectives: Knowing the developmental status of the midpalatal suture helps orthodontists treatment plan for maxillary transverse discrepancy. Current methods used to assess the maturity of the midpalatal suture are tedious, prone to subjectivity, and have poor reproducibility among non-expert examiners. Artificial intelligence has strong potential to reduce human error when evaluating the development of the midpalatal suture. Using an advanced machine learning method called deep learning (DL), numerical values can be applied to landmarks in digital images to allow identification of features and reliable classification of patterns. The objective of this study is to develop, test, and validate automated interpretable deep learning (DL) models for assessment and classification of midpalatal suture maturation stages (MPSMS) from CBCT images.
Methods: 618 CBCT images were collected and oriented on Dolphin Imaging Software. For each axial section, the midpalatal suture region of interest was extracted through image cropping and classified according to MPSMS (Stages A, B, C, D, E). After cropping, the images underwent data augmentation, including applying high-pass and Sobel filters, allowing the model to capture information across different orientations. Then, images were input into several pre-trained convolutional neural network (CNN) models for automated classification. To increase the accuracy of classification, the pre-trained models were modified to incorporate parallel structure, Discrete Cosine Transform (DCT), and modified margin-based negative logarithmic loss (MNRL) function, designed to improve classification by penalizing incorrect predictions. Images were then input into these novel architectures to provide an automated midpalatal suture classification.
Results: The performance of the various machine learning models ranged from 71.87% accuracy to 79.02% with an average accuracy of 74.63%. The addition of parallel structure, DCT, and loss function improved the model's ability to accurately predict the MPSMS.
Conclusions: This study introduces a deep learning-based method to automatically categorize the maturation stages of the midpalatal suture using CBCT images. This

method can improve the orthodontic diagnosis and treatment planning process, helping orthodontists determine appropriate interventions for patients with maxillary transverse discrepancy.
Approval: IRB Protocol Number 2022-1048
Funding: AAOF

60. PEDIATRIC EMERGENCY DENTAL CARE: A SIXTH-MONTH RETROSPECTIVE STUDY

Ji-Hoon Min, Bhakti Desai, Evalina H. Kratunova, Satish Alapati
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Endodontics, UIC College of Dentistry

Objectives: This study aimed to evaluate presenting complaints, diagnoses, and treatments provided to patients at a university-based postgraduate emergency pediatric dental clinic. It also assessed differences in care between medically healthy patients (American Society of Anesthesiologists [ASA] I) and patients with medical conditions (ASA II and above) to analyze emergency care practices.
Methods: A retrospective study was conducted on all pediatric patients attending the emergency postgraduate dental clinic over a six-month period. Data collected included patient demographics (age, sex, race, ethnicity), ASA classification, presenting complaints, diagnoses, immediate treatments, and next-visit plans. Statistical analyses included descriptive statistics, chi-squared tests, and regression models.
Results: The study included 343 patients (mean age: 6 years, SD: 3.1). Medically healthy patients comprised 72% of the cohort, while medically compromised patients accounted for 28%. Patients with medical conditions were older on average (6.6 years) compared to medically healthy patients (5.8 years; $p = 0.030$). The population was predominantly male (54.8%) and racially diverse, with 60% identifying as White, 23.5% as Black, and 3.8% as Asian. Hispanic ethnicity was reported by 43.7% of patients. Odontogenic pain was the most common presenting complaint (61.5%), followed by trauma (11.7%) and facial swelling (10.8%). Chronic odontogenic infections were diagnosed in 48.4% of cases, while trauma-related conditions accounted for 11.7%. Primary teeth were involved in 68.2% of cases, and extractions were the most frequent immediate treatment (51.6%). Initial comprehensive exams (33.2%) were the most common next-visit type. No significant differences in treatment type were observed between ASA classifications ($p > 0.8$).
Conclusions: This study provides an overview of pediatric emergency dental care at a postgraduate clinic. Odontogenic infections and extractions were the most frequent diagnoses and treatments, respectively. While children with medical conditions were older on average, their treatment patterns did not significantly differ from those of medically healthy patients. The findings support the need for evidence-based protocols and optimized resource allocation to address pediatric emergency dental care effectively.

Approval: IRB Protocol Number 2024-0354
Funding: N/A

61. MARIJUANA USAGE & EFFECTIVENESS OF LOCAL ANESTHESIA DENTOALVEOLAR SURGERY

Kaivon Moradi, Allison Renella Salmon, Michael Miloro
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: This prospective cohort study is designed to compare patients who use cannabis to patients who do not use cannabis to determine how the use of marijuana affects the efficacy of local anesthetic for dentoalveolar surgery. Patient experience data is obtained by utilizing a Likert scale survey to assess patient's anxiety prior to and following the procedure, their tolerance of the procedure, their experience regarding pain, pressure, and the variability of anesthesia sensation.
Methods: Eligible patients include those scheduled to get three or more extractions per quadrant or are getting one or more third molar teeth extracted. Both patients who do not use and do use marijuana are eligible. Patients in this study are required to utilize a Likert scale survey immediately after the procedure. Information collected from these patients includes demographics, marijuana use and details, alcohol use, diabetes status, and other health and basic information. Potential subjects are recruited by identifying eligible patients via the OMFS clinic schedule. Patients are asked on day of service if they wish to be enrolled. If they agree to enroll, they will sign a consent form and complete a basic information questionnaire on UIC Qualtrics after arriving at the clinic and before starting treatment. Major risks of participating in this study include loss of privacy and confidentiality.
Results: Data Collection In Progress.
Conclusions: Pending.
Approval: IRB Protocol Number TBA
Funding: N/A

62. DETERMINANTS OF UPPER LIP FORM: AN ANALYSIS USING GEOMETRIC MORPHOMETRICS

Alexander Munaretto, Christina Nicholas, Cameron Phen, Michael Han
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry, Department of Orthodontics, UIC College of Dentistry

Objectives: Orthodontics and orthognathic surgery can alter the upper lip. No relationships have been established between the maxillary dentoalveolar unit and upper lip angulation and form. The purpose of this study was to elucidate a relationship between the hard tissue contours of the dentolaveolar unit and the upper lip using geometric morphometric analysis (GM).

Methods: Retrospective cross-sectional study analyzing CBCT scans from 101 subjects using GM. Among the 101 subjects, 27 underwent maxillary repositioning surgery with CBCTs taken at least 6 months postop.
Inclusion criteria:
Patients from UIC OMFS who have undergone a full-field cone beam CT (CBCT) for their clinical needs.
Ages 12-64
CBCT taken with neutral positioning of the lips
Multiple landmarks were identified in the midsagittal plane for the maxillary dentoalveolar segment and upper lip, respectively.
Generalized Procrustes analysis (GPA) was run on the landmark data, sliding the semi-landmarks by minimizing bending energy. All subsequent analyses on the GPA-aligned coordinates. To examine overall shape variation in the sample, a principal components analysis (PCA) was run. A two-block partial least squares (PLS) analysis was performed to investigate covariation between the hard and soft tissue.
Results: Pre-op and Post-op data shows evidence of covariation between the lip and the alveolus (r-PLS=0.741, $p<0.001$). This was true even when controlled for the effects of allometry (r-PLS=0.728, $p<0.001$).
Conclusions: There is strong correlation between the contour of the anterior maxilla and that of the upper lip.
Approval: IRB Protocol Number TBA
Funding: N/A

63. ENHANCING ORAL HEALTH COMMUNICATION BETWEEN PROVIDERS AND PATIENTS IN ENDODONTICS

Ruchi V. Naik, Satish Alapati, Fatemeh S. Afshari, Georgia Lymberopoulos, Judy Yuan, Aniruddh Narvekar
Department of Endodontics, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Periodontics, UIC College of Dentistry

Objectives: After-visit summaries (AVS) have shown great promise in improving patient care in the medical field. In endodontics, where aftercare and follow-ups are regularly given, AVS have not been routinely implemented, but may be beneficial. This study evaluated the effectiveness of a printed AVS with audiovisuals resources on patients' understanding of endodontic procedures and retention of post-operative instructions.
Methods: An endodontic resident recruited English-speaking adult patients (n=30) at the University of Illinois Chicago College of Dentistry Endodontics Clinic, obtained informed consent, and randomly assigned participants to two groups: Verbal (Group A) or Written/Visual AVS (Group B). Following treatment, phone interviews were conducted to collect information regarding patients' understanding of treatment and

aftercare information. Descriptive analysis and Mann-Whitney non-parametric tests (α=0.05, 95% CI) were performed.
Results: Preliminary data was used for analysis (n=30) with 100% retention for treatment and interviews. Patients in both groups were satisfied with treatment explanation and post-operative instructions. The majority of Group B reported using audiovisuals between and after appointments. Group B also reported a significantly higher level of confidence with recalling treatment steps (p=0.012) and using audiovisual supplements (p=0.037) compared to Group A. Patient satisfaction with the resources provided was comparable across groups (p=0.075).
Conclusions: Patients reported satisfaction with communication and post-operative instructions in both groups. Written AVS led to improved recollection of treatment steps, and audiovisual resources supported patients' understanding. Clinically, integrating a written AVS into endodontic consultations and treatment appointments can enhance post-operative instructions, align patient expectations, and improve dental communication.
Approval: IRB Protocol Number 2024-0931
Funding: Wach Grant and ADEA Gies Grant

64. ASSOCIATION BETWEEN MALOCCLUSION AND OHRQOL IN THE MIXED DENTITION

Swathi L. Narayan, Veerasathpurush Allareddy, Brittaney Hill, David Avenetti, Bhakti Desai
Department of Pediatric Dentistry, UIC College of Dentistry, Department of Orthodontics, UIC College of Dentistry

Objectives: Interceptive orthodontic treatment is recommended for certain malocclusions in the mixed dentition. Early treatment aims to improve function and esthetics while reducing the complexity of phase II orthodontic treatment. Limited research explores patients' Oral Health-Related Quality of Life (OHRQoL) and the subjective perceptions of esthetics, function, and orofacial pain in different malocclusions. This cross-sectional study aims to (1) describe the OHRQoL in patients with different types of malocclusion and (2) assess differences in OHRQOL based on the type of malocclusion.
Methods: Surveys were distributed in a university-based clinic to patients and their parents via Qualtrics from (August – December 2024). Surveys collected sociodemographic information and orthodontic diagnosis. Parents and children completed validated English questionnaires: the Early Childhood Oral Health Impact Score (ECOHIS) and Child Oral Health Impact Profile (COHIP-SF19), respectively.
Results: Of the 58 surveys collected, 49 were analyzed (84.5% completion). Most patients were female (60.4%) and white (56.8%), with a median child age of 8 years. The most common diagnoses were dental or skeletal anterior crossbite (49.6%), followed by crowding (44.9%), posterior crossbite (26.5%), and "other"(14.3%).

Many children reported difficulties with eating (42.9%), pronouncing certain words (32.8%), avoiding smiling (24.5%), and experiencing bullying (24.5%) due to their teeth ("sometimes," "often," or "almost all of the time" vs. "never" or "almost never"). Additionally, 38% of children "fairly often/always" were aware of crooked teeth/spaces, and 65.3% anticipated a feeling of confidence once dental treatment was completed. Parents' assessment of children's OHRQoL was concordant with child assessment. Parents reported that they "often" or "very often" faced financial impacts due to dental care (18.4%) and took time off work for dental appointments (30.6%). However, these issues encompass all types of dental care in this primarily Medicaid population, such as preventive and restorative visits, not just orthodontics.
Conclusions: These findings suggest that malocclusion during the mixed dentition stage may impact children's self-image, while dental care also poses social and economic consequences for patients and their families. A larger sample size and further analysis are necessary to determine whether differences in OHRQoL are associated with various types of malocclusions. Future studies will evaluate the longitudinal impact of interceptive orthodontic treatment on OHRQoL while considering covariates such as caries experience and sociodemographic factors.
Approval: IRB Protocol Number 2024-0524
Funding: N/A

65. AN ARTIFICIAL INTELLIGENCE SYSTEM FOR STAGING THE SPHENO-OCCIPITAL SYNCHONDROSIS

Amanda Nikho, Lauren Mills, Omid Halimi Milani, Marouane Tliba, Rashid Ansari, Ahmet Enis Cetin, Mohammed H. Elnagar
Department of Orthodontics, UIC College of Dentistry,
Department of Electrical and Computer Engineering, UIC College of Engineering

Objectives: The spheno-occipital synchondrosis (SOS) can be found in the cranial base and fuses in adolescents, accommodating post-natal brain growth. Its ossification can be monitored to assess skeletal maturation, which is essential for orthodontic and orthopedic treatment planning. The goal of this study is to automatically classify the SOS fusion through the development, testing, and validation of a programed interpretable deep learning (DL) algorithm, a novel task to the knowledge of this author. We hypothesize that once trained, this DL algorithm will be able to accurately stage the five distinct phases of SOS ossification.
Methods: The cone beam computed tomography (CBCT) scans of 1200 orthodontic patients were collected from private practices in the midwestern United States. After removing images with poorly defined SOS fusion stages, the sample narrowed to 723 scans (370 females, 260 males, 93 unknown) with ages ranging from 7 to 68 years. Classification was performed by trained evaluators, including two orthodontic residents and an oral and maxillofacial radiologist, and the staging method employed was from the work of Bassed et al. (2010). All scans were oriented in three planes

following a standardized protocol. Then, the mid-sagittal slice was extracted where the synchondrosis fusion could be diagnosed. This region of interest (ROI) was then rotated counterclockwise until parallel with the horizontal plane and cropped to a standardized dimension. The ROI was fed to a DL model, involving a series of filters to emphasize low-level features and Convolutional Neural Networks (CNN) architectures to extract said features. The final data set was divided into subsets for training (80%), validation (10%), and testing (10%).
Results: The experimental results demonstrate the effectiveness of our proposed approach, achieving the highest classification accuracy of 89% with an F1 score of 86%.
Conclusions: The significance of the SOS in ontogeny of the skull is prominent, such that patients with syndromes, e.g., Crouzon, Downs, and Apert, demonstrate striking midface hypoplasia coinciding with early fusion of this synchondrosis. Inherently, a site with such governance on jaw relations is extraordinarily valuable to examine in the orthodontic field and, as alluded to earlier, can be recruited to measure skeletal maturity in collaboration with the cervical vertebrae or in lieu of it. This novel and innovative work launches a fully automated model for SOS fusion classification, thereby enabling clinicians to more easily and accurately diagnose skeletal maturity, predict growth potential, and prescribe appropriate treatment.
Approval: IRB Protocol Number 2022-1048
Funding: American Association of Orthodontists Foundation

66. MOLAR INCISOR HYPOMINERALIZATION AND DENTAL ANOMALIES: A CASE-CONTROL STUDY

Juno Park, Evelina H. Kratunova, Sahar Alrayyes, Majd Alsaleh, Maria Therese Galang-Boquiren, Azza Tagelsir Ahmed
Department of Pediatric Dentistry, UIC College of Dentistry, Department of Orthodontics, UIC College of Dentistry

Objectives: To evaluate the association between Molar Incisor Hypomineralization (MIH), early-life adverse environmental and medical events, and co-existing developmental dental anomalies (DDA).
Methods: This case-control study included children aged 6–13 years, with the presence of MIH serving as the inclusion criterion for the case group. Each child with MIH was matched with a child without MIH of similar age and demographic characteristics to form the control group. Trained and calibrated examiners assessed MIH using standardized diagnostic criteria. Biological mothers completed a structured questionnaire addressing pregnancy and early-life adverse events. DDA were identified through clinical and radiographic assessment. Statistical analyses included descriptive statistics, Chi-square and Fisher's exact tests, and logistic regression.
Results: A total of 56 children were enrolled, including 28 in the MIH group and 28 in the control group. The mean age was 9.32 ± 1.89 years in the MIH group and 8.24 ± 1.46 years in the control group. Among the MIH group, 89.3% were born in the

United States compared to 96.3% in the control group, and 70.4% were Hispanic or Latino compared to 78.6% in the control group. Developmental dental anomalies were significantly associated with MIH ($\chi^2 = 6.76$, $P = .0093$). No significant differences were found in pregnancy, environmental, and early-life adverse events between the MIH and control groups ($P > .05$).
Conclusions: This preliminary study demonstrates a significant association between MIH and the presence of DDA. Further research with larger sample sizes is needed to confirm these findings.
Approval: IRB Protocol Number 2023-1293
Funding: N/A

67. ELECTROCHEMICAL ANALYSIS OF HUMAN SALIVA FOR PERIODONTITIS AND GLYCEMIC STATUS

Fatima Qamar, Sujoy P. Ghosh, Mohamad K. Alhadlaq, Mathew T. Mathew, Russell Pesavento, Praveen Gajendrareddy
Department of Periodontics, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral Biology, UIC College of Dentistry

Objectives: Periodontitis is a chronic inflammation of the periodontium caused by persistent bacterial infection, leading to the destruction of supporting tooth structures. It affects approximately 40% of the US population. Current diagnostic parameters, including bleeding on probing, clinical attachment levels, plaque index, gingival index, and bone loss, primarily indicate a history of disease. However, these markers become measurable only after significant tissue damage, making them poor prognosticators of disease progression or severity. Since periodontitis often progresses asymptomatically, many patients delay seeking care until the destruction is irreversible, and the ability to reconstruct the periodontium becomes limited. Early diagnosis is, therefore, critical for effective preventive intervention. This pilot study outlines implementing a multidimensional microfluidic salivary sensor for the point-of-care (POC) assessment of periodontitis and related comorbidities. The project focuses on utilizing non-stimulated whole human saliva (WHS) as a non-invasive medium to monitor biomarkers associated with inflammation, soft tissue, and bone destruction, critical in periodontal disease progression. These biomarkers span microorganisms, enzymes, proteins, metal ions, and microRNA, ensuring a comprehensive approach to disease assessment.
Methods: The study uses WHS sample collection from 41 subjects, including controls and patients with varying stages of chronic periodontitis and A1c levels, to evaluate biomarkers' correlation with periodontal and diabetic conditions. A1c for each subject was tested chairside using a rapid A1c test during saliva collection. This specific research project aimed to determine whether electrochemical analysis using biosensors would lead to different results when testing WHS of patients with

and without periodontitis; and for patients with different A1c levels. Electrochemical analysis of WHS was completed using Gamry potentiostat and Gamry software. Open circuit potential (OCP), electrochemical impedance spectroscopy (EIS), and cyclic voltammetry (CV) were analyzed. Using this data, the capacitance and resistance of salivary samples were calculated.
Results: The evolution of open circuit potential and EIS data (Resistance and Capacitance) exhibit a clear difference between the WHS of subjects with normal A1c, pre-diabetes range A1c and diabetes range A1c. Additionally the CV area, or the total charge is higher for the subjects with elevated A1c values.
Conclusions: The findings suggest that the salivary biochemical properties may vary with glycemic status. These findings highlight the potential of salivary markers as adjunct diagnostic tools or indicators of periodontal disease risk in patients with varying levels of glycemic control.
Approval: IRB Protocol Number 2021-0960
Funding: NIH R01 DE031832

68. HOW DO NON-KERATOCYSTIC LESIONS RESPOND TO DECOMPRESSION TUBE PLACEMENT?

Michael B. Schiappa, Nicholas Callahan
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: The purpose of this study was to evaluate the volumetric reduction of non-keratocystic intrabony lesions of the jaws following decompression tube placement. Current practice involves placing decompression tubes after biopsying large cystic lesions with cystic linings. While this technique is well studied for odontogenic keratocysts, its efficacy for other lesion types remains unclear. We hypothesized that decompression would reduce lesion size across non-keratocystic pathologies, potentially decreasing surgical morbidity by minimizing the need for extensive resections.
Methods: A retrospective cohort study was conducted at the UIC Department of Oral and Maxillofacial Surgery, including patients treated with decompression between January 2017 and January 2022. Subjects were identified through surgical logs and chart reviews, and IRB approval was obtained (IRB #2022-0071). Lesion types, volumetric changes, and treatment outcomes were analyzed. Statistical comparisons were made using descriptive statistics and inferential tests to evaluate differences in size reduction and treatment responses.
Results: Eighty-three subjects (34 female; 49 male) with an average age of 32.8 years were included. Dentigerous cysts (n=45, 54.2%) showed the greatest mean size reduction (68.39%, -0.027 cm^3/day), followed by periapical cysts (n=12, 14.5%; 40.84%, -0.016 cm^3/day), ameloblastomas (n=7, 8.4%; 30.91%, -0.059 cm^3/day), and inflammatory cysts (n=5, 6.0%; 45.24%, -0.020 cm^3/day). Most patients underwent enucleation and curettage (n=52, 62.7%), while others required resection (n=12,

14.5%) or achieved resolution with tube removal (n=9, 10.9%). Dentigerous cysts showed a significantly greater size reduction than other lesion types (P = .046), though no significant difference in rate of change was found (P = .46). Ameloblastomas showed limited response, with some increasing in size before definitive treatment.
Conclusions: Decompression significantly reduces the size of non-keratocystic lesions, particularly dentigerous and periapical cysts, supporting its use as an initial treatment. However, its benefit for ameloblastomas is questionable given the limited response and potential for lesion growth. Careful patient selection and close follow-up are essential to optimize outcomes while minimizing surgical morbidity.
Approval: IRB Protocol Number 2022-0071
Funding: N/A

69. ROLE OF ORTHODONTISTS IN THE CONTINUUM OF CRANIOFACIAL MICROSOMIA CARE

Priya Shah, Maysaa Oubaidin, Min Kyeong Lee, Praveen Gajendrareddy, Veerasathpurush Allareddy
Department of Orthodontics, UIC College of Dentistry,
Department of Periodontics, UIC College of Dentistry

Objectives: Craniofacial microsomia is a developmental defect that presents as an asymmetric development of craniofacial structures derived from first and second branchial arches. There is a wide variety of clinical presentations and severities to the condition. There is great variation in treatment protocols and timing among clinicians, particularly in the preference of surgical intervention before or after skeletal maturity. This study aims to identify craniofacial team related factors that are associated with the treatment protocols that they use and identify commonalities in various treatment protocols and establish a standardized treatment approach that can be used to treat patients with CFM. From the treatment protocols identified, we aim to qualitatively delineate the role of orthodontist in the continuum of craniofacial microsomia care and the various orthodontic and surgical interventions and their timing followed by the craniofacial teams across the United States.
Methods: A 15-item questionnaire was distributed electronically to 121 craniofacial teams across the United States via Qualtrics Survey Software. The survey included 3 major blocks: Treatment Characteristics, Diagnosis, and Treatment of CFM. The questions explored craniofacial center characteristics, case load, diagnostic tools and systems, as well as preferences in surgical and orthodontic treatment methods. 22 respondents completed the full survey, thus resulting in an 18% response rate. Descriptive statistics were obtained to summarize the data Chi Square tests and Fisher's Exact test were used to find any associations between predictor and outcome variables. All statistical tests were two-sided and statistically significant at a p-value of <0.05.
Results: A statistically significant association was found between status of academic

accreditation and number of active orthodontic cases, where non-academically accredited centers had fewer active orthodontic cases. No other statistically significant associations were obtained.
Conclusions: Most respondents reported performing mandibular surgery after the pubertal growth spurt or at skeletal maturity. However, several participants reported an exception where early surgery may be considered during growth to control or improve facial asymmetry if the patient is experiencing significant psychosocial challenges compromising their quality of life. This sheds valuable light on the potential indications of early versus late surgical intervention. Most respondents reported using traditional orthodontic brackets with functional appliances and mini-implants as adjunctive treatment modalities to achieve orthopedic and orthodontic treatment objectives. The results of this study provide a framework for future studies to define a clear standard of care for craniofacial microsomia cases.
Approval: IRB Protocol Number 2023-0190
Funding: American Association of Orthodontists Foundation Research Award, Dr. Allan G. Brodie Craniofacial Chair Endowment

70. MONITORING SALIVARY IMMUNE PROFILES IN RESPONSE TO NONSURGICAL PERIODONTAL THERAPY

Matt Tokarski, Kristofer Ceredon, Joseph Gluck, Sarah Elsayed Elshourbagy, Raza Naqvi, Joel Schwartz, Afsar Naqvi
Department of Periodontics, UIC College of Dentistry,
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: Saliva is increasingly recognized as a valuable diagnostic fluid for monitoring oral health status due to its ease of non-invasive collection and rich biomarker content. Limited evidence exists regarding saliva's ability to aid in assessing the immune activity in periodontal disease (PD) and its resolution. Precise immune subset identification associated with PD pathology may facilitate development of novel diagnostic or prognostic cellular markers. This study examined the prognostic value of saliva in periodontal disease progression in response to non-surgical therapy, by monitoring Myeloid (Macrophages/Monocytes) and Lymphoid (B Cells) immune subsets.
Methods: This ex-vivo, case-control study focused on salivary immune profiling in human subjects before and after NSPT (n=29/group). Periodontally healthy (n=13) samples from age- and gender-matched controls were collected from subjects presenting for crown lengthening and soft tissue augmentation procedures. Clinical parameters including pocket probing depth (PPD), bleeding on probing (BOP), & plaque index (PI) were measured pre- & post-NSPT. Salivary immune cells were evaluated for flow cytometry and GCF cytokines were quantified by multiplex.
Results: Our results show significant reductions in the PPD (6.67x10-5), BOP (1.24x10-8), PI (3.05x10-5), and clinical parameters post-NSPT in PD subjects

compared to healthy controls. Assessment of the cellular immune mediators revealed decreased levels of the M1 (CD11b+CD14+HLA-DR+IFNγ+) macrophages and IFNγ+CD19+ B cell populations in PD subjects following NSPT. On the contrary, higher levels of M2 macrophage (CD11b+CD14+HLA-DR+IL-10+) and CD19+IL-10 B regulatory cells was observed in post-NSPT. This correlates with the clinical parameters observed following NSPT.
Conclusions: Overall, the reduction in the M1 macrophage and B cell subsets and the converse increase in the regulatory M2 macrophage and B cells correlates with the clinical improvement in periodontal disease. Therefore, saliva can provide relevant clinical information regarding the response of periodontal therapy.
Approval: IRB Protocol Number 2016-0696
Funding: NIH R01 DE027980, NIH R21 DE026259

EDUCATIONAL RESEARCH

71. SOCIAL EXPERIENCES OF BLACK MALE DENTISTS ATTENDING HBCUS VERSUS NON-HBCUS

Avery Brynn Berger, D'Nai Mikael Ashford, Patrick Dean Smith
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: According to the American Dental Education Association, Black men make up only 2% of dental school graduates. There are unanswered questions regarding how to support Black men's academic success in predental education programs and how to alleviate social factors that may have negative influences on their readiness and competitiveness in applying to dental school. The purpose of the study was to assess differences in the levels of reported negative impact of social experiences on academic performance among Black male dentists who attended Historically Black Colleges and Universities (HBCUs) versus those who attended non-HBCUs. We hypothesized that HBCU attendees would report lower levels of social experiences having negative impacts on their academic performance.
Methods: This cross-sectional study surveyed Black male dental school graduates from October 2023 to February 2024. Participants were recruited through convenience sampling via a national network of Black male dentists. The survey assessed participants level of agreement that their academic performance in getting into dental school was negatively affected by financial hardship, academic hardship, racial discrimination, social isolation, lack of support from faculty and administration, and family and community stress. Descriptive statistics, chi-square tests, and t-tests were used to analyze survey data.
Results: Eighty-seven Black male dentists participated in the survey. The mean age of participants was 46.6 years (SD=12.91), and 48.3% attended a HBCU. HBCU attendees reported experiencing lower levels of agreement that their academic performance was impacted by financial hardship ($p=0.039$), social isolation ($p=0.001$), lack of support ($p<0.001$), racial discrimination ($p<0.001$), and stress from family/community issues ($p=0.006$) compared to non-HBCU attendees.
Conclusions: Findings suggest that relative to non-HBCU experiences, HBCUs may provide more positive and supportive environments that either mitigate or negate some negative social experiences on academic performance for Black male students. Additionally, study participants who attended HBCUs may have had higher levels of academic resilience to negative social experiences, be it pre or post enrollment in their respective undergraduate programs.
Approval: IRB Protocol Number 2023-1147
Funding: N/A

72. COMPARATIVE ANALYSIS OF STUDENT PERFORMANCE: TEAM BASED LEARNING VS. TRADITIONAL LECTURE

Marina Boctor, Grace Viana, Majd Alsaleh, Luma Odeh
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry,
Department of Orthodontics, UIC College of Dentistry,
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: To evaluate the impact of active learning strategies, specifically Team-Based Learning (TBL), compared to traditional lecture-based methods on the academic performance and critical thinking skills of foreign-trained dental students at the University of Illinois Chicago, College of Dentistry.
Methods: The study included 48 foreign-trained dentists enrolled in the advanced standing dental program at the University of Illinois Chicago, College of Dentistry. All participants received primary education in their home countries through traditional teaching methods and completed two courses at UIC-COD utilizing active learning strategies, including Team-Based Learning (TBL). Participants were randomly assigned to two groups: Group A (traditional lecture) and Group B (TBL). Both groups were taught the same material, and their performance on a low-stakes quiz was compared. Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 29.0. Descriptive statistics and Chi square test were completed to compare group performance and assess significant differences in quiz outcomes.
Results: A difference in the proportion of correct answers was observed only for Question #4 ($p < 0.05$). Group A (Traditional) demonstrated a higher proportion of correct responses (23/25) compared to Group B (TBL) (15/23). No significant differences were found for other quiz questions between the two groups.
Conclusions: The findings suggest that the Team-Based Learning (TBL) approach did not outperform traditional lecture methods in a limited 4-question low-stakes quiz conducted immediately after the lecture. These results highlight the challenges of evaluating active learning strategies and underscore the need for further studies with larger sample sizes using high-stakes summative exam scores to assess long-term information retention. The limitations include the timing of the lecture, the availability of pre-session materials for both groups, the type and number of questions, and the differences in student academic excellence between the two groups. However, these results help us better understand the conditions under which TBL is more effective in enhancing critical thinking, problem-solving, and deep learning in dental education.
Approval: IRB protocol Number 2024-1120
Funding: ADEA ADCFP

73. VIDEO-BASED LEARNING IN PRE-PATIENT CARE ENDODONTIC EDUCATION

Anh Minh Bui, Qian Xie
Department of Endodontics, UIC College of Dentistry

Objectives: Previous predoctoral students at the UIC College of Dentistry have mentioned the lack of updated demonstration videos as a challenge in the Pre-Patient Care endodontic course. This study evaluates the impact of newly developed demonstration videos on students' performance and confidence in performing root canal treatments.
Methods: Weekly demonstration videos were created and uploaded as an optional learning resource. DMD and DMD-AS students in the Pre-Patient Care endodontic course were invited to complete a survey assessing the perceived effectiveness of the videos. Exam scores were analyzed to measure the impact on student performance. These results are further supported by examining students' performance during in-person practical assessments.
Results: A majority of students reported improved familiarity with root canal procedures after watching the videos, with perceived confidence levels increasing by 1-3 points on a 5-point self-assessment scale. Particularly for DMD students learning endodontic procedures for the first time, the videos provided a visual representation that helped them better understand the lab manual and clarified expectations for the in-person sessions.
Conclusions: Demonstration videos offer a visual guide that complements traditional learning methods, helping students prepare for practical assessments. Further analysis will assess their impact on student performance, with the potential to refine and expand this learning resource.
Approval: IRB protocol Number 2023-1194-MOD001
Funding: N/A

74. TRANSFORMING BIOMEDICAL SCIENCE EXAM REVIEWS THROUGH INTERACTIVE LEARNING TECHNOLOGIES

Lianna M. Chacon, Edilberto Castillo, Asha Eapen
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: At the University of Illinois Chicago (UIC) College of Dentistry, traditional and online tutoring methods often fail to address diverse learning needs and encourage collaboration effectively. To overcome these challenges, in-person, peer educator-led review sessions utilizing the platform, Nearpod, were introduced to group tutoring sessions. These sessions aimed to create a more engaging and dynamic learning environment while improving attendance and fostering collaboration. The objective of this study was to describe the use of Nearpod during review sessions with the goal of enhancing attendance, student engagement, collaboration, and understanding of biomedical sciences.

Methods: The sessions leveraged Nearpod's interactive features, such as quizzes, polls, and collaborative problem-solving activities, to target key topics and conduct real-time assessments. A majority-rule approach was applied, revisiting concepts if fewer than 50% of students answered correctly. This strategy transitioned the program from low-attendance virtual Zoom sessions (~<10%) to a highly attended in-person format, resulting in sustained engagement. Attendance was determined by numbers taken from a sign-in sheet.
Results: Attendance rates exceeded 80% for all sessions, with continued strong participation even in optional reviews, demonstrating the effectiveness of the interactive format. Nearpod facilitated real-time feedback, peer-supported learning, and enhanced engagement among students.
Conclusions: The introduction of Nearpod-driven, in-person peer educator-led review sessions at the University of Illinois Chicago College of Dentistry successfully addressed the limitations of traditional and online tutoring methods. By fostering a dynamic and interactive learning environment, these sessions significantly improved attendance, engagement, and collaboration among students. The sustained high attendance rates, even for optional sessions, underscore the value of this approach in enhancing student understanding of biomedical sciences. These findings support the continued use and potential expansion of Nearpod-driven sessions as an effective educational tool in dental education.
Approval: N/A
Funding: N/A

75. ASSESSING CLINICAL COMPETENCY AND EFFORTS BETWEEN DMDAS AND DMD STUDENTS

Aarti Chaudhary, Stephanie M. Ward
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This study explores how diverse students adapt to the clinical environment, focusing on strategies they employ to overcome challenges in practical settings. Specifically we aim to understand how different educational backgrounds affect clinical proficiency and how programs can be tailored programs to ensure consistent quality of care. This project is to compares the observed demonstration of advanced clinical skills of DMDAS students due to their experience with prior clinical education with or a more consistent effort across all clinical skills of DMD students or both groups show high levels of engagement in clinical tasks. Understanding these differences can inform curriculum design and support strategies tailored to each student cohort, ultimately enhancing educational outcomes in dental programs.
Methods: Data for this report was collected through an anonymous Qualtrics survey that was distributed to the dental school faculty, who has been monitoring and involved with instruction of both cohorts in clinics. In the survey, we asked the Clinical faculty responded to multiple choice and open-ended questions related to student clinical

performance skills, communication, and openness to get feedback from the faculties by both cohorts of students. Qualitative data was coded using inductive technique for descriptive analysis. Quantitative data was recorded using a 6-point Likert scale.
Results: Results of the survey indicate that 18% of the responding faculty were from Endodontics, 12% from Periodontics, 59% from Restorative and 12% other academic units' faculties who participated in the study. Overall, most of the faculty perceived that DMD students are more efficient, aware of clinic policies, pick up skills fast, cautious with procedural skills, and willing to take feedback from the faculty to learn than are students in the DMDAS program. On the other hand, most of the faculty responded that DMDAS students are not aware of clinic policies, perform well with motor skills and find it difficult to accept critical feedback from the faculties. Even with these differences, at the end of the curriculum, both cohorts of students balance on their performance and find ways to succeed. The findings support our hypothesis, we see a Results demonstrate a statistically significant association between clinical competency and perceived effort for both cohorts. We would also expect this association to grow stronger as students' experiences and clinical time increase. Lastly, we explored how each group of students adapt to the clinical environment, focusing on strategies employed to overcome challenges in practical settings.
Conclusions: The DMD and DMDAS cohorts differ in several ways, likely because of diverse interests in academics and research. The pre-dental experience of DMD students, may make them they are more likely familiar with clinic rules, more organized with notes and in maintaining patient records, and in management skills. DMDAS students are most likely to rely on their own previous clinical experiences. At the completion of the curriculum, both cohorts are provided similar experiences. These findings can inform recommendations for curriculum adjustments that cater to the specific needs of students and will enhance overall curriculum effectiveness.
Approval: IRB Protocol Number 2024-1227
Funding: N/A

76. IMPACT OF ANATOMY STUDY AIDS ON STUDENT CONFIDENCE AND ANXIETY

Syuzanna Darbinyan, Alison F. Doubleday
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: This study describes the development of an anatomy study workbook and investigates the impact of the workbook on first-year dental students' confidence in the knowledge of anatomy material and on anxiety levels associated with laboratory practical exams. The workbook helps students organize materials into categories, illustrations, and descriptions of important features to increase familiarity with material through repeated exposure and encouraging both independent and collaborative work. The study aim is to determine if providing students with a workbook that employs various ways to organize and structure their learning impacts confidence levels

and decreases anxiety during exams. We hypothesize that there will be an increase in confidence and a reduction in anxiety during test-taking as a result of using the workbook.
Methods: Data was collected through an anonymous Qualtrics survey administered to first-year dental students. All first-year dental students were provided with an information session and given the opportunity to participate in the study. Recruitment occurred via email at the beginning of the fall 2024 semester. After each anatomy exam, participants were invited to complete a survey reporting confidence and anxiety levels. Participants answered a set of Likert scale questions and were provided with the opportunity to submit their name to a raffle for a $25 gift card.
Results: Three independent exams were administered to students during the semester. 13 of 70 total students responded to the survey after exam 1, 10 responded after exam 2, and 7 after exam 3. Not all respondents reported using the entire workbook. Respondents identified charts and picture references as the most useful workbook activities. Before the first exam, confidence ranged from fairly, slightly, to somewhat confident, while anxiety ranged from fairly anxious to very anxious. With every consecutive exam, confidence in knowledge appeared to decrease, although students generally felt the same or less anxious, and none reported feeling more anxious.
Conclusions: The results demonstrate that students value active learning strategies like filling out charts, drawing, and finding reference pictures and that many prefer to use only parts of the workbook. Students felt less anxious before exams later in the semester, which could be due to using the workbook or due to increased familiarity with the testing format. A decrease in confidence in knowledge across the semester may be due to differences in exam content or that the workbook helped students identify knowledge gaps eliminating false confidence prior to exams. This should be investigated in the future. The results support the use of diverse study aids in anatomy education to reduce anxiety and increase understanding of the material.
Approval: IRB Protocol Number 2024-0999
Funding: N/A

77. EVALUATING DENTAL STUDENTS' APTITUDE IN AGE IDENTIFICATION ON PANORAMIC RADIOGRAPHS

Gavin Hage, Lauren Weger, Maria Therese Galang-Boquiren
Department of Orthodontics, UIC College of Dentistry

Objectives: In this pilot study, we aimed to assess predoctoral dental students (D1-D4) in their ability to correctly identify dental age by eruption pattern and dental development, as observed on a panoramic radiograph. These participants will be expected to identify dental age, not chronological age. Dental age is determined using tooth emergence and tooth calcification (Macha et al., 2017). This study will determine the ability of students to assess dental age as a developmental stage that corresponds to chronological age but is defined by typical eruption patterns and tooth development,

not by date of birth. Our goal is to identify potential areas for improvement in the dental curriculum regarding student accuracy in recognizing abnormalities in tooth development, eruption patterns, and eruption timing.
Methods: Each predoctoral cohort, D1-D4, was sent a UIC Qualtrics Survey via email collected by the UIC Dental listserv outlining the research study and requesting consent. The survey contains six de-identified panoramic radiographs: one with primary dentition, two early mixed, two late mixed, and one with permanent dentition (collected and de-identified by Dr. Galang). Participants then viewed each radiograph and identified the dental age of the patient and the stage of development that they were in. Radiographs with ideal stages of development are provided: primary (~6 mo-6 yr), early mixed (~6 yr-9 yr), late mixed (~10 yr-13 yr), and permanent (~12+ yr) (Proffit, 2019). - +2 score if the age is correct, +1 if the stage is correct, -1 if the age is incorrect, and -2 if the stage is incorrect. (Scored -18 to +18).
Results: We hypothesized that dental students, as they progress to graduation, are underprepared for analyzing panoramic radiographic images and determining whether or not there is a discrepancy in the patient's dental development. The pilot survey results, with 78 responses, demonstrated that the average cohort's (D1-D4) self-reported confidence and preparedness in performing the analysis was only a 3 out of 5. Additionally, cohorts D1 through D3 had an average performance of ~45-50%, while D4s only scored ~63%, demonstrating that the student body may be ill-prepared for this clinical task.
Conclusions: The age profile of patients seeking care at dental schools is around 52 years old (Radfar & Suresh, 2007). This leads to a concern as dental students may have limited exposure to panoramic interpretation of the mixed dentition outside of their scheduled rotations in pediatrics and orthodontics. We have demonstrated that each cohort finds age-related panoramic interpretation difficult. Thus, the analysis of dental development should be better reinforced throughout each year of dental education. A dentist's ability to identify developmental anomalies in radiographs is a basic skill required for the proper treatment and referral of pediatric and mixed dentition patients who are in their care.
Approval: IRB Protocol Number 2024-0638
Funding: N/A

78. ADVERSE OUTCOMES FOR ALL CERAMIC CROWNS FABRICATED IN A DENTAL SCHOOL SETTING

Paulina Kapica, Danny Hanna, Bin Yang, Fatemeh S. Afshari
Department of Restorative Dentistry, UIC College of Dentistry, Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objective: This study aimed to report the rate of failure of all ceramic crowns in the predoctoral program at University of Illinois Chicago, College of Dentistry (UIC-COD) and the associated causes of failure. The objectives were to compare in-house

fabricated digital e.max CAD (IHF) and commercial lab fabricated all ceramic (CLF) crowns including e.max and zirconia, and to provide a benchmark for adverse outcomes in an academic setting.
Methods: A retrospective chart review was performed on data of adverse outcome reports recorded in the electronic health record (EHR, axiUm, Exan, Coquitlam, BC, Canada) as part of UIC-COD quality assurance in the predoctoral program. Deidentified data over a five-year period (08/16/2019 - 08/15/2024) was collected on IHF and CLF crowns. Descriptive analysis was performed.
Results: Over the five-year period, 1,080 total IHF and 1,925 total CLF crowns were fabricated and delivered. Of the delivered IHF crowns, a total of 30 adverse outcomes were reported (2.78%) with an associated 35 deficiencies necessitating further intervention or remake. The most common reason for adverse outcome occurrences included: marginal adaptation (13, 37.1%), pulpal pathosis (5, 14.3%), interproximal contact (5, 8.6%), fractured restoration (3, 8.6%), and decementation (3, 8.6%). Of the delivered CLF crowns, a total of 62 adverse outcomes were reported (3.22%). Approximately a quarter of the commercially fabricated crowns with adverse outcomes were e.max.
Conclusions: A small percentage of all ceramic crowns provided within a predoctoral clinical program by dental students have identified deficiencies post-delivery necessitating further intervention. The documentation and analysis of post-delivery adverse outcomes for all ceramic crowns may serve as a benchmark in an academic setting.
Approval: IRB Protocol Number TBA
Funding: N/A

79. STUDENT PERCEPTIONS OF PEER CLINICAL MENTORSHIP IN HEALTHCARE TRAINING

Matthew C. Melatti, Susie Shin, Marissa Lauren Wadhwa, Judy Yuan, Fatemeh S. Afshari, Danny Hanna
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: The purpose of this study was to evaluate the impact of peer mentoring on third- and fourth-year dental students during their clinical years. Specifically, this study evaluated the student-perceived benefits and satisfaction with the Clinical Mentorship Program (CMP) at the University of Illinois Chicago, College of Dentistry.
Methods: Data was collected through an anonymous Qualtrics survey that was administered to third- (mentee) and fourth-year (mentor) students following their mentorship experience. Survey questions were formatted as free response, multiple choice, and 5-point Likert scales. Responses were grouped and reported as frequencies to observe common trends. Data was included for the classes of 2022 through 2026.
Results: Across all five academic years, 74.6% (n=229) of traditional DMD students

and 79.4% (n=210) of Advanced Standing (AS) students either agreed or strongly agreed that they were satisfied with the CMP. The DMD mentors reported with the highest consensus that the CMP provided a beneficial opportunity to apply the principles of teaching and learning. The mentees' strongest consensus was that participating in the CMP helped to reduce anxiety, increase their confidence, and provide a greater degree of social support in the clinics. Following the CMP, mentees reported that they were most confident expressing empathy in patient interviews and least confident when navigating the electronic health record (axiUm).
Conclusions: Results indicate beneficial outcomes of the clinical mentorship program as perceived by both mentors and mentees. The CMP may serve as an adjunct learning modality for clinical education and assist with student transition into clinical patient care.
Approval: IRB Protocol Number 2024-1181
Funding: N/A

80. PERCEPTIONS OF DIVERSITY, INCLUSION, EQUITY, AND BELONGING AMONG DENTAL STUDENTS

Deniz Namik, Betti Shahin
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Diversity, equity, inclusion, and belonging (DEIB) are essential components of academic environments, including dental schools, where they enhance learning outcomes, cultural competence, and a sense of community. Despite ongoing initiatives, periodic evaluation of diversity perceptions is necessary to ensure they meet the needs of students from diverse backgrounds. This study aims to assess perceptions of diversity at the University of Illinois Chicago College of Dentistry (UIC COD), evaluate its impact on students' learning and dental education, and identify opportunities for improvement.
Methods: A cross-sectional survey was used to gather quantitative data from UIC COD students. A total of 52 participants, consisting of randomly selected students from each cohort (D2, D3, D4, AS3, AS4), were invited to complete the survey. The survey included questions about participants' self-identified demographic characteristics and 13 DEIB-related statements rated on a 5-point Likert scale. The statements assessed perceptions of diversity, equity, and inclusion in the dental school environment and its perceived impact on learning and collaboration. The data was analyzed through bivariate analysis.
Results: The data collected from this study revealed that while most students agreed that UIC COD respects individuals and values their differences, fewer felt that the curriculum and media are fully inclusive to all students' backgrounds. Interactions among students from diverse backgrounds were rated positively, with more than half of the respondents agreeing or strongly agreeing that students interact well across differences. However, awareness of the Diversity Advisory Committee (DAC) and its

activities was limited. Close to half of the participants reported growing appreciation for DEIB due to their experiences at UIC COD.
Conclusions: The findings from this project highlight the strengths of UIC COD in fostering a respectful and collaborative environment while pointing to opportunities for greater inclusivity in curriculum content and increased visibility of DEIB initiatives. They also emphasize the importance of continued efforts to create a more inclusive academic environment that supports diverse student experiences and prepares culturally competent dental professionals. With continued research on this topic, academic institutions can better understand diversity perceptions within the dental school environment. This information can guide future DEIB initiatives and provide strategies to enhance cultural competence, improve collaboration, and promote an inclusive learning atmosphere for all dental students.
Approval: IRB Protocol Number 2024-0939
Funding: N/A

81. IMPACT OF HIGH-YIELD PROBLEM BASED LEARNING REVIEWS ON EXAM PERFORMANCE

Adelle Perkelvald, Edilberto Castillo, Blase Brown, Asha Eapen
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objective: Problem Based Learning (PBL) is a cornerstone of the dental education curriculum at UIC College of Dentistry, fostering collaborative, case-based learning among students. Despite its benefits, challenges in identifying high-priority content for exams have hindered students' ability to maximize their study efforts effectively. This study aims to evaluate the impact of centralized high-yield PBL reviews on improving academic performance and enhancing first-year dental students' perceptions of PBL resources.
Methods: A mixed-method design was employed for this study. Quantitative analysis compared module exam scores between the Class of 2028 (n=71), who received centralized PBL reviews, and the Class of 2027 (n=68), who did not. Additional within-group comparisons were performed for the Class of 2028 to evaluate score differences before and after the implementation of centralized reviews. Qualitative data were gathered through voluntary surveys administered via Qualtrics, capturing students' perceptions and feedback regarding the utility of the reviews. All data were de-identified prior to analysis to ensure confidentiality.
Results: Preliminary findings demonstrate a positive trend in student performance and engagement. The average exam scores for the Class of 2028 showed a 2-3% increase compared to the Class of 2027. Survey feedback indicates that students perceive the reviews as valuable for enhancing their focus during study sessions and improving their understanding of key concepts.
Conclusions: The provision of centralized high-yield PBL reviews prior to module exams has the potential to significantly enhance both exam performance and student

satisfaction. These findings highlight the value of structured and focused study aids in improving learning outcomes within dental education.
Approval: IRB protocol Number 2024-0839
Funding: ADEA ADCFP

82. IMPROVING DENTAL EDUCATION THROUGH SOCIAL MEDIA AND MICROLEARNING

Tala Elfaki, Ardita Ajdini, Ariana Rafaty, Ryan Rezania, Judy Yuan, Fatemeh S. Afshari, Cortino Sukotjo, Qiao Fang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This study examines how social media-based microlearning, using TikTok and Instagram videos, affects student engagement and learning outcomes. Specifically, it focuses on the teaching of dental implant procedures, exploring whether short-form educational content can complement traditional learning methods and enhance pedagogical approaches in dental education. Microlearning, which delivers content in concise, focused units, is particularly suited to the preferences of the younger generation, Gen Z, who are accustomed to consuming educational content via social media platforms.
Methods: The study involved two groups of dental students (n=64 students). Group 1 (I-TV) first viewed TikTok/Instagram videos (less than 5 minutes), followed by traditional videos (over 10 minutes), and completed post-intervention surveys for each. Group 2 (TV-I) followed the reverse sequence of watching traditional videos then TikTok/Instagram videos. Stratified random sampling ensured equal representation of students across the third and fourth years and programs. Descriptive and statistical analyses were performed using a statistical software program (IBM SPSS Statistics, v27.0; IBM Corp). The Mann-Whitney U test and the chi-square test with Yates correction were used to assess participants' understanding of TV and Instagram as a teaching method for dental implantology education and demographics. (α=.05 for all tests). The study received Institutional Review Board (IRB) approval (STUDY2024-0611).
Results: There was no significant difference between I-TV and TV-I regarding using apps like YouTube (P=.820), Instagram (P=.296), and Snapchat (P=.574) for pleasure. However, I-TV frequency of using these apps to find dental information was higher. Student's perception on the length of video differed between I-TV and TV-I groups as 46.9% (n=15) of TV-I group stated that 1-2 mins were the optimum length of the dental education videos. The TV-I group perceived Instagram educational dental implant lesson videos as more credible (P=.002), and felt more confident in applying the knowledge in real-life settings (P=.018) compared to the I-TV group. However, there were no significant differences between the groups in terms of the engagement of Instagram videos versus traditional materials (P=.862), finding it more credible if Instagram dental content were to be verified officially by the curriculum (P=.556).

Conclusions: The findings of this study could inform future teaching strategies in dental education, potentially enhancing engagement and learning outcomes through microlearning and social media. Short-form video platforms effectively engage Generation Z dental students by providing a credible and interactive learning medium that aligns with their preferences. Incorporating microlearning into curricula has the potential to enhance education outcomes and address generational gaps.
Approval: IRB protocol Number 2024-0611
Funding: N/A

83. EDUCATIONAL ADVANTAGES OF DIGITAL DENTISTRY IN SURVEYING

Andrew Shim, Alexandra Rodriguez, Camila Zamperini, Alkan Sezginis, Adriana Semprum-Clavier, Reem Sabbagh, William Lee, Betti Shahin
Department of Restorative Dentistry, UIC College of Dentistry

Background: Surveying plays a critical role in determining the path of insertion for Removable Partial Dentures (RPDs) and ultimately influences their overall design. With the rise of CAD/CAM technology promising quick and precise results, questions about its potential use as an educational tool for teaching RPDs have emerged. This study seeks to evaluate how digital dentistry can support students by serving as an additional resource in RPD design.
Methods: 25 dental students and 10 faculty were randomly selected for participation. Participants were asked to survey a partially edentulous cast following analog and digital protocol. First, subjects marked the height of contour (HOC) on the mid-buccal surfaces of teeth #2 and #12. They attached a handle to the surveyed cast, indicating the path of insertion. The participants used an intraoral scanner to image the diagnostic cast surfaces. The 3Shape Unite Software was employed to align the model to the same path of insertion and generate a heatmap of undercuts. Participants completed a survey containing eight questions, rating their level of agreement with each statement on a scale from 0 to 10, with 10 indicating strong agreement.
Results: The survey results revealed a generally positive response to the utility and effectiveness of the 3Shape Unite Software in visualizing undercuts in RPD casts. Participants preferred the digital surveying method over traditional manual techniques, with an average score of 8.36. Additionally, the digital method enhanced their understanding of undercuts, reflected in a mean score of 7.86. The comprehensive testing of subjects has not yet been completed and is scheduled to be conducted at a later time.
Conclusions: To be determined.
Approval: IRB Protocol Number 2023-1177
Funding: N/A

84. PEER CLINICAL MENTORSHIP IN HEALTHCARE TRAINING: A FOCUS GROUP STUDY

Marissa Lauren Wadhwa, Matthew C. Melatti, Judy Yuan, Danny Hanna, Fatemeh S Afshari

Department of Restorative Dentistry, UIC College of Dentistry, Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: To aid students transitioning from pre-patient to the clinical curriculum, an adjunctive learning modality, the Clinical Mentorship Program (CMP), has been utilized at the University of Illinois Chicago, College of Dentistry (UIC-COD) since 2022. This study aimed to evaluate student perspectives of the CMP and its effectiveness in aiding the transition from year two to year three via a focus group study of mentee and mentor dental students.
Methods: Advanced standing dental students volunteered to participate in a focus group study. The group was composed of 5 third-year (mentee) and 5 fourth-year (mentor) dental students. The focus group study was led by a faculty member, who served as facilitator following a pre-written script. The discussion was audio recorded, transcribed, and analyzed.
Results: All students reported that the CMP was beneficial in offering mentees exposure to patient interactions, the electronic health record, and guidance/feedback from the mentors. The fourth-year students shared that mentoring through the CMP offered a valuable opportunity to reflect on their acquired knowledge, reinforced concepts and techniques, which boosted their confidence in the clinical setting. Some disadvantages highlighted in the focus group included the scheduling conflicts between the CMP and intramural rotations, the program's limited duration, and the personality compatibility between the mentor and mentee due to random pairings. Recommendations for improvement included extending the duration, rotating mentor-mentee pairings, structured framework, training for mentors, and outline of expectations.
Conclusions: The feedback from the focus group suggests that the CMP is a valuable tool that is essential to learning the protocols and logistics of patient care at UIC-COD. Addressing the identified limitations may enhance the program's effectiveness in easing students into patient care and facilitating a smoother transition into the clinical years.

Approval: IRB Protocol Number 2024-1181
Funding: ADEA ADCFP, Department of Oral Medicine and Diagnostic Sciences

POPULATION HEALTH SCIENCES

85. THE INFLUENCE OF POPULATION VARIATION AND OBESITY ON FACIAL GROWTH

Suzanne Abreu, Ingrid Harb, Oluchi Echeumuna, Stephon Lashawn Carr, Christina Nicholas
Department of Orthodontics, UIC College of Dentistry

Objectives: A growing number of studies have indicated that childhood obesity can affect the timing of dental development, accelerating dental maturation. Several studies suggest that children with obesity may also experience precocious facial growth and perhaps differences in mandibular dimensions, especially condylion-pogonion. What remains unclear is whether this difference in timing varies by ancestry group, and the interaction between demographic characteristics and obesity. Variation in patterns of facial growth (shape) are also less clear, with studies showing inconsistencies in which aspects of facial shape may be affected. The primary aim of this study was to examine the interaction between demographic characteristics (e.g. ancestry, sex) and environmental factors such as BMI, SES, and food insecurity on the timing and pattern of facial skeletal growth. We hypothesize that (1) children with obesity will show relatively accelerated facial growth regardless of self-reported ancestry; and (2) that variation in facial shape related to obesity will be mediated by self-reported ancestry.
Methods: In this study, we examined facial growth in a sample of contemporary orthodontic patients (n=105) who were prospectively recruited during their "records" appointment at the UIC Department of Orthodontics. These subjects had lateral cephalograms and height/weight taken during their appointment. They were also given a detailed 12-item demographics questionnaire. The questionnaire consisted of questions regarding self-identified ancestry/ethnicity; ancestry/ethnicity of grandparents; household income; parental educational attainment. Geometric morphometric analysis of facial shape was carried out. Descriptive statistics and linear regression were used for data analysis.
Results: Of the 105 patients, 97 children (mean age 13.2 years, SD 1.7) met the inclusion criteria. No significant association was found between BMI and facial form. However, principal component 3 (PC3) displayed significance by age, sex, and non-Hispanic Black subjects ($p= 0.001$; $p=0.016$; $p= 0.027$), while PC4 was significant by age and non-Hispanic Multiracial subjects ($p=0.024$; $p=0.004$).
Conclusions: Non-Hispanic Black subjects exhibited greater midfacial prognathism and gonial angle, while non-Hispanic Multiracial subjects had greater nasal bridge protrusion, ramus length, and midfacial protrusion. These differences in facial growth patterns may influence orthodontic treatment needs and the optimal timing for orthodontic interventions.
Approval: IRB Protocol Number 2022-1374
Funding: UIC Allan G. Brodie Award, AAOF Research Aid Award

86. EVALUATING DENTAL STUDENT CLINICS IN MANAGING PATIENTS WITH SHCN

Zoya Ahmed, Jocelyn Gonzalez, Hajar Mchabcheb, Shahd Louaibi, Robert Rada
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: The Commission on Dental Accreditation Standard 2-25 defines special needs populations as those "whose medical, physical, psychological or social situations make it necessary to consider a wide range of assessment and care options". The objective of this study is to evaluate the effectiveness and impact of student-managed dental clinics in increasing access to oral healthcare for underserved and special needs populations.
Methods: Data regarding number of patients treated, patient demographics (age/ special needs/ etc), and number and type of procedures performed on each patient were collected at three different student-managed clinics. These three clinic sites are the RefugeeOne Dental clinic (which provides free dental services to recent immigrants, refugees and asylum seekers), the El Valor Dental Clinic (which provides free dental services to Latinx patients who face intellectual and developmental disabilities), and the AdventHealth Free clinics (which is a free screening and referral day for patients with dental needs and limited financial support). The data tracked the delivery of treatment outcomes as well as student participation and comfort in treating these populations.
Results: The AdventHealth clinics has allowed over 60 dental students to participate and manage patient care and over 900 patients have attended these clinics from 2022 to 2024. Of those 900, 364 patients were seen by our students for free dental services. Since December of 2022, there have been over 23 clinic service days at the RefugeeOne dental center with an average of 6 patients seen per day, so over 128 patients seen and 180 students managing their care.
Conclusions: The study demonstrates that all three of the student-managed dental clinics are effective in improving access to oral healthcare for underserved populations, including refugees, individuals with complex medical needs, those with intellectual and developmental disabilities, and those that struggle with socioeconomic disparities. By addressing the unique challenges faced by these groups, the clinics not only provide essential dental services but also seek to establish a dental home for ongoing care and maintenance. Additionally, the programs offer valuable hands-on experience for dental students, fostering their clinical, organizational, and patient management skills, especially for this unique population of patients.
Approval: N/A
Funding: N/A

87. PARENTAL PERSPECTIVES ON CHATGPT AS AN ORAL HEALTH INFORMATION RESOURCE

Victoria Chang, Bhakti Desai, Brittaney Hill, Nicola Hill, Maria Therese Galang-Boquiren, David Avenetti

Department of Pediatric Dentistry, UIC College of Dentistry, Department of Orthodontics, UIC College of Dentistry

Objectives: Patients increasingly obtain oral health (OH) information from online sources and artificial intelligence tools. As ChatGPT becomes more popular, understanding parents' familiarity and attitudes toward the quality of its information will inform dentists how it can be used as an OH education resource. This cross-sectional study aims to assess how parents perceive the accuracy and helpfulness of ChatGPT responses to pediatric-specific clinical questions. This study hypothesizes that parents with higher SES will have greater familiarity/experience with ChatGPT than those with lower SES, but that all participants will describe ChatGPT's information as accurate and helpful.

Methods: Qualtrics® surveys were distributed to parents in three clinical settings from Aug-Nov 2024: a private fee-for-service office, a private primarily Medicaid-serving office, and a university-based Medicaid-serving clinic. Surveys included parent and child sociodemographic and self-reported oral health questions. Parents also described their familiarity/experience with ChatGPT, then rated the accuracy and helpfulness of six ChatGPT responses covering a range of pediatric dentistry topics (e.g., prevention, treatment, safety). Bivariate and multivariate logistic regression were conducted to account for covariates, such as SES.

Results: 234 of 302 surveys were analyzed (surveys with >75% of questions completed). Parents were 80.6% female, 33.4% under 35 years old, 42.5% White, 32.6% Hispanic, and 10.3% Black. Most were employed full-time (68.4%) and attained education beyond high school (70.9%). Children were 52.8% male and primarily 6-to-10 years old (48.1%). Most families had two or more adults (80.1%) and two or more children in the home (77.1%). Medicaid insurance was associated with less regular parent dental care, poorer self-reported child and parent oral health, and likelihood of having a restorative vs. preventive visit ($P<0.001$). Parents with private insurance reported greater familiarity/experience using ChatGPT ($P=0.037$) but were less inclined to believe that patients will use ChatGPT as an OH resource in the future ($P=0.018$). More than 80% of participants rated all six ChatGPT items as "very" or "somewhat" accurate and helpful, with no significant differences between Medicaid and privately insured participants.

Conclusions: Parents across the SES strata find ChatGPT information to be accurate and helpful, although familiarity and experience vary with some sociodemographic characteristics. Given that Medicaid-enrolled children reported poorer oral health and more restorative care, ChatGPT is a promising tool for OH promotion but may be less accessible and less utilized in this population. Further research is needed to explore the

implications of these findings for pediatric dental care and OH education.
Approval: IRB Protocol Number 2024-0591
Funding: N/A

88. PERIODONTAL DISEASE RISK ASSOCIATED WITH LONG COVID

Sarah Elsayed Elshourbagy, Afsar Naqvi
Department of Periodontics, UIC College of Dentistry

Background: SARS-CoV-2 infection leads to long-term health problems affecting multiple body systems termed long COVID. Currently, limited information exists about long-term oral health manifestations in COVID-19 patients with restricted healthcare access.
Methods: We conducted a longitudinal study (2019-2024) to assess how racial differences (Black/Hispanic vs White/Asian) and health disparities affect oral and non-oral long COVID symptoms and their relationship with COVID-19 vaccination in subjects presented to UIC dental clinics between 2019 (N=1742) and 2020 (N=1157). In two separate prospective groups (N=171) of COVID-19 positive subjects (3-6 months after initial exposure), we examined clinical indicators of oral (periodontal and salivary glands) and non-oral (neurologic) sequalae. We measured viral S protein by flow cytometry and quantified inflammatory markers, viral receptors, and oral viral load to correlate molecular, and cellular changes in COVID-19 positive subjects before and after vaccination.
Results: Our results indicate that oral PASC primarily manifested as periodontal (gum) disease (COVID-19 positive: 73.1±18.9% vs COVID-19 negative: 33.1±14.3%) and correlates with higher rates of dry mouth (57.5%), taste disturbance (47%), and smell loss (20%). Vaccination reduced oral PASC in COVID-19 positive subjects; however, their periodontal health indicators remained worse compared to the COVID-19 negative group. Notably, 3-6 months post-infection, while SARS-CoV-2 Spike (S) transcript was rarely detected in saliva (6.4%), its protein was commonly detected in the COVID-19 positive subjects indicating poor viral clearance. This finding was further supported by higher prevalence of other oral viruses: Epstein-Barr Virus (70.5%), Herpes Simplex Virus (8.1%), and Human Papillomavirus (17.5%) in COVID-19 positive subjects, demonstrating an interaction between different viral types. This correlates with significantly higher expression of viral entry receptors, inflammatory mediators, and immune cells in COVID-19 positive subjects.
Conclusions: COVID-19 history significantly correlates with severe oral health complications in predominantly Black communities, while vaccination reduced but did not eliminate these issues. The oral cavity serves as a long-term viral reservoir, and periodontal inflammation may create conditions that impair viral clearance. Elevated viral presence in COVID-positive patients may increase susceptibility to both oral and non-oral viral diseases.
Approval: IRB Protocol Number 2016-0696
Funding: N/A

89. SURVEY EVALUATING CURRENT STATE OF NUTRITIONAL COUNSELING IN EDENTULOUS PATIENTS

Elias Guerra, Khatija Noorullah, Swee Tan
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: The purpose of this study is to assess the current quality and quantity of nutritional counseling that current patients at UIC College of Dentistry received before becoming edentulous. We hypothesized that edentulous patients seen at the UIC College of Dentistry pre-doctoral clinics did not receive sufficient nutritional counseling before losing their teeth.
Methods: Edentulous patients within the Pre-Doctoral Student Clinics (Group Practice Clinics and Chicago Clinic) at the UIC College of Dentistry were invited to enroll in this study. Inclusion criteria: Adults (>18 y.o.) and currently edentulous. A retrospective questionnaire was approved by IRB as exempt. This survey was administered to patients through an online Qualtrics QR code. The patients were questioned on their current edentulous status, demographics, length of time as edentulous, current use of dental prosthesis, weight changes, referral to dietitian, proper preparation for edentulous diet change, foods avoided while edentulous.
Results: A total of 28 survey responses were completed and met the inclusion criteria (Edentulous). 75% (21 out of 28) of respondents reported not receiving nutritional counseling from their dentist, while 89% (25 out of 28) reported not being referred to a registered dietitian for guidance on dietary changes prior to or following complete tooth loss. 61% (17 out of 28) of participants felt inadequately prepared for the nutritional challenges associated with becoming edentulous. 85% (24 out of 28) expressed a desire for a referral to a dietitian and 75% (21 out of 28) for a discussion with their dentist about dietary adjustments. Furthermore, more than half (16 out of 28) experienced weight loss after becoming edentulous, ranging from 1-40+ lbs. Patients identified similar food groups as difficult to consume both with and without a prosthesis, including 46% (13 out of 28) reported difficulty with firm foods (e.g., vegetables), 68% (19 out of 28) with crunchy items (e.g., chips), and 68% (19 out of 28) with chewy foods (e.g., meat).
Conclusions: This study highlights a significant gap in nutritional support for individuals who become edentulous. Most respondents did not receive guidance from their dentist or referrals to a dietitian to help manage the dietary changes that accompany tooth loss. Many felt unprepared for these challenges and expressed a desire for more professional support in adjusting their diets. Additionally, the majority experienced weight loss, with a common difficulty in consuming firm, crunchy, and chewy foods, regardless of whether they had a prosthesis. These findings suggest a need for greater integration of nutritional counseling and referrals to dietitians in the care of edentulous patients. This also highlights the need for nutritional counseling

didactic courses during dental education for improved patient care.
Approval: N/A
Funding: N/A

90. ASSESSING PATIENTS' DENTAL NEEDS WITHIN THE INCLUSIVE CARE CLINIC

Rainah Hanif, Nada Marei, Renata Zoraida Rizental Delgado, Isabella Silva Catananti, Juliana Bertoldi Franco, Andres Felipe Ledesma Giraldo, Gloria Maria Pimenta Cabral, Leda Mugayar

Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Pediatric Dentistry, School of Dentistry of Ribeirao Preto, University of Sao Paulo, Ribeirao Preto, Sao Paulo, Brazil,
Department of Hospital Dentistry, University of Sao Paulo, Sao Paulo, Brazil

Objectives: Dental treatment for patients with disabilities is often influenced by fear, myths, and discrimination. Establishment of ICC allows dental care to be provided based on the specific individual dental needs of those with disabilities. This study aims to detail the dental demand at the Inclusive Care Clinic (ICC) of the University of Illinois-Chicago during its first month of operation.
Methods: A retrospective study was conducted based on electronic medical records of patients treated at ICC between March 2024 and April 2024. Data collected included age, gender, date of last dental visit, type of dental insurance, and relevant medical history. Study considered clinical exam, preventive, restorative, periodontal treatments, radiological exams, and extractions. Additionally, number of patients referred for general anesthesia and to postgraduate clinics was analyzed, as well as need for wheelchair-accessible offices, use of the desensitization room, and use of protective stabilization. Legal guardians signed an informed consent form for dental treatment and research purposes, ensuring anonymity and permitting use of collected data for educational and scientific purposes. Data were compiled and organized in a spreadsheet using Microsoft Office Excel for tabulation. Results were described using descriptive statistics for quantitative variables, as well as absolute and relative frequencies for categorical variables.
Results: In the first month, ICC treated a total of 122 pts, with average age of 30.7 years. Of these pts, 68 (55.73%) were male, and 90 (80.35%) had cognitive disabilities. On average, each patient took 2.21 medications. All dental treatment was covered by insurance, and average time since last dental visit was 2 years. 192 initial visits were completed, including medical history reviews, intraoral clinical exams, and treatment planning. Additionally, 177 preventive dental treatments, 104 periodontal treatment, 70 imaging exams, 7 extractions, and 6 restorations were completed. Due to difficulties with treatment in dental setting, 8 patients were referred for general anesthesia, and 48 (39.34%) patients were referred to postgraduate clinics for specific dental needs. For

inclusive care, 20 (16.39%) patients utilized the wheelchair-accessible room, 7 (5.73%) patients used desensitization room, and 2 (1.6%) patients received treatment with a papoose board.
Conclusions: This study underscores importance of dental treatment for patients with disabilities, emphasizing education and prevention. Understanding patient demands is crucial for effective treatment planning, and maintaining oral health. Comprehensive assessment and treatment provided, along with full coverage by health insurance, demonstrate feasibility and effectiveness of inclusive dental care models, promoting dignity and inclusion for patients with disabilities.
Approval: N/A
Funding: N/A

91. COVID-19 CLINICAL OUTCOMES IN HOSPITALIZED PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Katharine G. Howard, Kirstie K. Danielson, Rebecca S. Monson, Ashima Sahni, Maria Therese Galang-Boquiren
Department of Orthodontics, UIC College of Dentistry, Department of Medicine, UIC College of Medicine

Objectives: COVID-19 is caused by the novel coronavirus, SARS-CoV-2. Existing literature indicates that obstructive sleep apnea (OSA) is an independent risk factor for poor COVID-19 outcomes, and a pro-inflammatory state and immune dysregulation have been suggested as mechanisms underlying both diseases. The aim of this retrospective case-control study is to evaluate clinical factors associated with COVID-19 severity in hospitalized patients with a clinically documented history of OSA compared to a matched control group of hospitalized COVID-19 patients with no documented history of OSA.
Methods: UIC's COVID Registry for Research (UCRR), a database containing demographic and clinical information of the first case series of inpatients who were hospitalized at UI Health between January 1, 2020, and May 6, 2020, and tested positive for COVID-19 between March 20 and April 30, 2020, was examined to identify patients with a documented history of OSA. Patients with OSA were matched 1:1 to control patients from the same UCRR with no documented history of OSA. Cases and controls were matched based upon: age, sex, race, ethnicity, and BMI category. The dependent variables: vitals, inpatient length of stay, ventilation, oxygen support, symptoms, ICU admission, mortality, inflammatory biomarkers, CPAP use and adherence, and readmission beyond 20 days after testing positive until August 30, 2020 were selected to represent COVID-19 severity and were collected from the UCRR and from Cerner electronic medical record.
Results: Of the 251 patients in the UCRR who were hospitalized at UI Health, 41 cases with a documented history of OSA and 41 matched controls with no documented

history of OSA were identified. Based upon matching, there were no statistically significant differences in demographic variables between cases and controls; overall, mean age was 57.5 ± 12.0 years, (48%) were male, (63.4%) were African American, (69.5%) were non-Hispanic/Latino, and (75.6%) were in the BMI category of obese. Patients without OSA versus with OSA, respectively, were more likely to present at baseline with respiratory distress (41.5%, 19.5%; p=0.031) and chills (43.9%, 22.0%; p=0.034). Patients with OSA versus without OSA, respectively, were more likely to require oxygen support via nasal cannula (65.9%, 43.9%; p=0.046) and non-invasive ventilation (9.8%, 0%; p=0.040) as the maximum O2 support needed during admission. No statistically significant differences were found between inpatient length of stay, ICU admission, baseline levels of inflammatory markers, number of readmissions, and mortality.
Conclusions: Despite being more likely to present with less respiratory distress, patients with OSA were more likely to require advanced levels of oxygen support during admission. Future research will be required to evaluate the role of potential respiratory compensations in OSA patients, particularly in regard to respiratory challenges such as COVID-19.
Approval: IRB Protocol Number 2022-0774
Funding: N/A

92. POTENTIAL EFFECT OF POLYPHARMACY ON THE ORAL MICROBIOME WITH AGE

Tanya Khosla, Tahniat Nadeem, Guy R. Adami, Betti Shahin
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: Improvements in health care, nutrition, lifestyles, habits, and safety practices, have led to increased numbers of the elderly in the US. With old age comes increased levels of disease and loss of fitness. Both endogenous and exogenous factors contribute to the aging process and in the oral cavity. The human microbiome changes with aging and with loss of fitness, and may contribute to declines seen with aging. Much evidence exists for this in the gut, with less known for the mouth. Strong links have been detected between aging and rates of periodontal disease and the nature of dental decay. The focus for this study is polypharmacy, the usage of multiple drugs to treat multiple diseases and conditions in an individual. Polypharmacy rates increase with age. We sought to determine if polypharmacy is linked to reductions in saliva flow and if loss of fitness has reproducible effects on the oral microbiome.
Methods: An initial group of 55 saliva donors was formed and controlled for levels of caries and periodontal disease, as both of these factors contribute strongly to salivary microbiome identity. Stimulated saliva was collected and tested for levels of bacteria by 16S rRNA amplicon sequencing. Multiple variable analysis was done to determine

taxa associated with increased medication needs. A second group again controlled for periodontal disease and dental decay was formed. For all subjects saliva flow rate was measured.
Results: Bacterial taxa in the two groups were identified that were associated with polypharmacy after correction for the presence of oral disease. Saliva flow rates had minimal effects on bacteria identified in this analysis. With polypharmacy we saw elevated levels of V. parvula, P. acidifaciens S. mutans and S. Australis but no significant changes in alpha diversity. We will report on the results of similar analysis with a validation set of participants.
Conclusions: Oral bacteria taxa were identified that are associated with polypharmacy in the elderly. These may contribute to some of the challenges seen with dental health in this group.
Approval: IRB Protocol Number 2021-0947
Funding: N/A

93. FOOD INSECURITY'S RELATIONSHIP WITH CHILDREN'S BMI AND GENERAL ANESTHESIA

Alexander Le, Shahrbanoo Fadavi, Patrick Dean Smith, Maria Rahmandar, Brittaney Hill
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Pediatrics, Northwestern University Feinberg School of Medicine

Objectives: Children in food insecure (FI) households typically intake more calorie dense, processed, and cariogenic foods, which may lead to higher Basal Metabolic Index (BMI) levels and numerous caries. Poor dietary intake stemming from FI may lead to extensive dental caries requiring dental treatment under General Anesthesia (GA). We hypothesize that FI children will present with a higher BMI and will be more likely to require dental treatment under GA.
Methods: This cross-sectional study included patients (ages 3-17) receiving dental care at UIC COD and their guardian. A survey was completed by the patient's legal guardian during their dental exam. Additionally, data regarding the child's caries status, BMI, and need for GA were abstracted from their electronic dental records. Descriptive statistics and bivariate analysis were conducted with a significance threshold set at $P<0.05$.
Results: 251 children with a median age of 7.0 years were recruited for the study. 55% of children were female. 36% of children identified as White, 30% Other, 23% Black and 5% Asian. Sixty-one percent identified as Hispanic or Latino. 67% of households presented with low food security and 26% with very low food security. 56% were healthy weight, 20% overweight, and 21% obese/severely obese. 38% of patients required treatment under GA and 62% did not. Overall, there was no association between FI and BMI ($p=0.660$), but there was marginal evidence for a positive association between FI and BMI within several groups, with the strongest evidence

among Black subjects. There was no significant association between FI and need for GA (p=0.089).
Conclusions: Results suggest no association between FI and BMI or the need for GA. However, we must recognize that 93% of our study population presented with low or very low food security and over half did not have a healthy BMI. Additional studies are needed in more diverse patient populations to further examine this association.
Approval: IRB Protocol Number TBA
Funding: N/A

94. EPIDEMIOLOGICAL PROFILE OF PATIENTS WITH DISABILITIES TREATED AT UIC ICC

Nada Marei, Rainah Hanif, Gloria Maria Pimenta Cabral, Isabella Silva Catananti, Renata Zoraida Rizental Delgado, Juliana Bertoldi Franco, Andres Felipe Ledesma Giraldo, Leda Mugayar

Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Pediatric Dentistry, School of Dentistry of Ribeirao Preto, University of Sao Paulo, Ribeirao Preto, Sao Paulo, Brazil,
Department of Hospital Dentistry, University of Sao Paulo, Sao Paulo, Brazil

Objectives: Dental offices designed specifically for the care of patients with disabilities are essential to ensure the provision of accessible and compassionate dental care. Understanding who these patients are and their individual characteristics is crucial for defining their needs and structuring appropriate services. This study aims to describe the demographic profile of patients treated during the first month of operation at the Inclusive Care Clinic at the University of Illinois-Chicago.
Methods: A descriptive retrospective study was conducted based on the electronic medical records of patients treated at the ICC of UIC between March 2024 and April 2024. Epidemiological data collected included age, gender, ethnicity, legal guardian, and distance traveled for the appointment. The analysis of medical conditions covered disabilities, comorbidities, and medications used. Legal guardians signed an informed consent form for dental treatment and research purposes, ensuring anonymity and permitting the use of the collected data for educational and scientific purposes. Data were compiled and organized in a spreadsheet using Microsoft Office Excel for tabulation. The results were described using descriptive statistics for quantitative variables, as well as absolute and relative frequencies for categorical variables.
Results: In the first month, the clinic treated a total of 122 patients. Among them, 68 (55.73%) were male, and the average age was 30.70 years. Regarding race, 74 (60.65%) patients were White, and 29 (23.77%) were Black. In terms of family support, 98 (80.32%) patients were cared for by family members. The patients' diagnoses varied widely:45 (36.88%) had developmental disabilities, 23 (18.85%) had both developmental disabilities and systemic diseases, 12 (9.83%) had syndromes, 10 (8.19%) had both syndromes and systemic diseases, 10 (8.19%) had neurodegenerative

diseases, 23 (18.85%) had systemic, mental, and oncological diseases. Regarding medication usage, 89 (72.95%) patients were taking medications, with 28 (22.95%) using four or more medications. The average distance from home to the clinic was 23.66 miles, and the average time since the last dental visit was two years.
Conclusions: This description of patient demographics highlights the complexity of conditions among patients with disabilities treated at the clinic. The Inclusive Care Clinic serves as an exemplary model for other institutions, emphasizing the importance of a compassionate and personalized approach by trained professionals in the care of patients with disabilities.
Approval: N/A
Funding: N/A

95. PATIENT'S PERCEPTION TOWARDS DENTAL STUDENTS' EMPATHY

Yusra Masood, Scott Tomar, Khatija Noorullah, Laila Iqbal, Patrick Dean Smith, Sobia Bilal
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: Dental anxiety hampers effective patient care, affecting communication, treatment adherence, and satisfaction. Empathy is vital in reducing anxiety by building trust and enhancing clinician-patient interactions, yet it is often underemphasized in dental education. The Consultation and Relational Empathy (CARE) Measure, developed by Mercer et al., is a validated tool to assess empathy in clinical settings. This study applied the CARE Measure to evaluate dental students' perceived empathy during patient interactions, identifying areas for curricular improvement.
Methods: The study employed the CARE Measure to assess patients' perceptions of dental students' empathy during clinical consultations at the University of Illinois Chicago College of Dentistry. Patients attending outpatient clinics were invited to complete an online version of the CARE Measure during their waiting time for treatment. Participants gave their written informed consent for participation. The CARE Measure consists of ten items on which respondents rate aspects of practitioner' empathy such as listening, compassion, and involvement in decision-making. Each item is scored on a 5-point Likert-type scale from Poor (1) to Excellent (5). Descriptive and analytical statistical methods, including Pearson correlation, were used to analyze the data.
Results: Data were collected from dental patients (sample size of 100 was calculated with 80% power and 0.05 significance level) during their waiting time at UIC College of Dentistry clinics through a voluntary, anonymous CARE survey, with written consent obtained prior to participation. Majority reported positive experiences in terms of feeling at ease, being listened to, and having their concerns understood. On average, patients rated dental students highly across most items of the CARE Measure, with the highest mean scores for ""being positive"" (4.34) and ""explaining things clearly""

(4.27). Significant differences in empathy scores were observed based on patients' prior visits, with those returning for multiple consultations rating dental students more positively than first-time visitors i.e. mean empathy scores were consistently higher among patients who had visited the clinic more than once (range: 4.119 – 4.342) than among patients who had visited the clinic just once before (range: 2.944 – 3.412) or were there for their first visit (range: 3.200 – 3.467); $p<.001$.
Conclusions: The CARE Measure effectively assessed patients' perceptions of dental students' empathy. Findings show that students with higher empathy enhance patient retention and satisfaction. These results emphasize the need for empathy training in dental curricula to improve patient-centered care. Recommended interventions include focusing on communication skills, empathy development, and emotional management to help students build trust and reduce patient anxiety.
Approval: IRB Protocol Number TBA
Funding: Wisconsin Collaborative for Healthcare Quality

CASE REPORTS

96. DIGITAL MANAGEMENT OF FAILED ZYGOMATIC IMPLANTS

Waleed Abdul Fattah, Leila Ahmadian, Michael Han, Rand F. Harlow, David Shonberg, Dima Ghunaim
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: To present the management of failed zygomatic implants in a patient with multiple risk factors, subsequent surgical and prosthetic treatment, including immediate provisionalization on the day of re-implantation.
Methods: A 62-year-old female presented six months after prosthesis delivery with mobility of a maxillary zirconia fixed prosthesis supported by two endosteal and two zygomatic implants. Clinical and radiographic assessment revealed bilateral zygomatic implant mobility, indicating failed osseointegration. Medical and dental history revealed poorly controlled diabetes (HbA1c 8%), history of periodontitis, and previous endosteal implant failure. As an interim treatment, the patient's previous conversion prosthesis was modified and reattached intraorally. The patient then underwent a comprehensive diabetes management program, reducing HbA1c to 6% over 12 months, and maintaining glycemic stability for an additional 3 months. The day of surgery, the failed implants were replaced. Implant positions were indexed using a PIC scan. Intraoral scans were done to capture the soft tissues. An interim prosthesis was digitally designed using ExoCad software, printed using SprintRay Pro 55, and stained with the OptiGlaze.
Results: The patient was closely monitored postoperatively and continued to function well without signs of loss of osseointegration. For fabrication of the final monolithic zirconia prosthesis, a new soft tissue intraoral scan will be captured and merged to the original photogrammetry scan.
Conclusions: Patient education on the importance of glycemic control is essential. Clinicians should consider achieving optimal glycemic control before additional interventions. The use of photogrammetry provides a reliable, efficient, and precise workflow to capture implant positions and to fabricate prostheses.
Approval: N/A
Funding: N/A

97. NON-INVASIVE MANAGEMENT OF WHITE SPOT LESIONS USING CURODONT™

Nadim Al-Sayyed, Dana Al-Sayyed, Majd Alsaleh
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: White spot lesions (WSLs) are a significant aesthetic concern, especially for patients who have undergone orthodontic treatment, have poor oral hygiene, or

have dietary habits that lead to early enamel demineralization. Traditional treatments for WSLs often involve invasive procedures that can compromise enamel integrity, and methods like fluoride may not effectively penetrate the lesion. This case report highlights the use of Curodont™, a nano-hydroxyapatite-based bioactive peptide that promotes guided enamel remineralization. This approach offers a non-invasive solution to enhance enamel remineralization and improve aesthetic outcomes for patients with WSLs.

Methods: Two patients presenting with visible white spot lesions were treated with Curodont™. The bioactive agent was applied during in-office procedures, and patients were followed up after one month. Baseline and follow-up clinical photographs were taken to assess lesion improvement, and enamel surface changes were evaluated through visual inspection.

Results: Significant improvement in the appearance of white spot lesions was observed after one month of treatment with Curodont™. The lesions became less opaque and blended more naturally with the surrounding enamel. Patients reported high satisfaction with the esthetic results, and no adverse effects were noted during the follow-up period.

Conclusions: This case report highlights the effectiveness of Curodont™ as a non-invasive and patient-friendly method for managing white spot lesions. The treatment encourages enamel remineralization and improves aesthetics without the need for invasive restorative procedures. These bioactive peptide-based technologies represent advancements in aesthetic and preventive dentistry.

Approval: N/A
Funding: N/A

98. MANAGING A PATIENT ON IV BISPHOSPHONATE

Sara Balouta, Susan Rowan, William Lee, Swee Tan
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Bisphosphonates such as Reclast (zoledronic acid), are a common treatment for osteoporosis. Compared to oral bisphosphonates, IV bisphosphonates have a higher risk of MRONJ (Medication-Related Osteonecrosis of the Jaw) particularly when dental extractions are planned shortly after administration. This case report discusses the management of a patient who received IV bisphosphonate two days prior to the scheduled extractions for the delivery of a maxillary immediate complete denture. The primary objective was to minimize MRONJ risk while preserving function.

Methods: An 83-year-old female patient on IV bisphosphonate presented for #8-10 extractions and maxillary immediate complete denture delivery. The patient had received Reclast two days prior to the scheduled appointment. Considering the potential MRONJ risk, the decision was made to retain the remaining natural teeth and to postpone the extractions and the delivery of the immediate denture to a later date.

However, in consideration of the patient's esthetics and functional concerns during the interim period, it was decided to provide the patient with a provisional prosthesis while preserving the processed immediate complete denture for future delivery once the remaining teeth could be extracted. A digital workflow was utilized to duplicate the processed maxillary immediate denture and modify it to accommodate the retention of the remaining teeth. A 3Shape E4 desktop scanner was used to scan the maxillary immediate denture and the patient's maxillary diagnostic cast. The 3Shape software was used to create a model from the maxillary immediate denture, then align the denture scan and maxillary immediate denture model with the diagnostic cast scan. The subsequent merged scan was modified digitally by removing the teeth #8-10 from the denture. The 3D printed denture was manufactured in 2 pieces (denture base and teeth) at the UIC Digital Lab and then subsequently bonded together. At the denture delivery appointment, the 3D printed denture was adjusted and modified to accommodate the natural teeth, while preserving the anterior flange for enhanced retention.
Results: The decision to retain the remaining natural teeth, combined with the digital workflow to duplicate the conventionally processed immediate denture, resulted in a well-fitting and functional 3D printed interim prosthesis. The patient reported comfortable fit, no MRONJ related complications and expressed satisfaction with the function of the denture.
Conclusions: This case highlights the importance of careful planning for patients on IV bisphosphonates, particularly when extractions are required. By retaining the natural teeth and employing a digital approach, the risk of MRONJ was minimized, achieving an acceptable outcome.
Approval: N/A
Funding: N/A

99. MODIFYING PPS AREA OF MAXILLARY TRIAL DENTURE TO IMPROVE RETENTION

Prameelarani Betanapalli, Swee Tan
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The final impression is an important step of complete denture fabrication. An inadequately recorded final impression will negatively impact denture retention and fit. For maxillary complete dentures, the fit and adaptation of the posterior palatal seal (PPS) area have a significant effect on the retention of the denture. This case study aims to demonstrate how a deficient final impression in the PPS area results in poor denture fit and retention, and how the deficiency was corrected to achieve an acceptable outcome.
Methods: A 70 yrs-old male patient presented for the posterior teeth try-in of maxillary & mandibular complete dentures. During the evaluation of the maxillary trial denture, it became apparent that the record base exhibited poor retention. Upon examining the record base and the final impression, we observed irregularities in the

master cast and the final impression at the PPS and hamular notch areas. The hamular notches appear underextended in the impression and are consistent with what is shown on the master cast. Fit checker was applied to the record base to capture the impression of the palate to measure the discrepancies. The thickness of the fit checker material was measured was between 1.5 to 3 mm at the PPS area. The largest discrepancies were in the areas next to the hamular notches. These measurements indicated that the record base was not adapting to the tissue surface. Notably, the fit checker material significantly enhanced the retention of the record base by filling the gap between the soft tissue and the base. It became evident that the PPS and hamular notch areas were under-recorded when the master cast was compared with the intraoral anatomy. To further enhance the retention, we deepened the master cast at the PPS to provide a better seal for denture base. We also extended the record base around the hamular notches with baseplate wax, resulting in additional retention. To evaluate the fit and retention, we applied rope wax at the PPS area on the intaglio surface of the record base. The adjustments resulted in improved suction and retention with the maxillary trial denture.
Results: During the denture delivery, the maxillary denture was found to have acceptable retention. During the 24hr follow-up, the patient reported using a small amount of denture adhesive to enhance the retention. Overall, the patient was satisfied with his maxillary denture's fit, comfort, and retention. Further evaluation and adjustments will be made during subsequent follow-up appointments.
Conclusions: This case study highlights the importance of obtaining an accurate final impression for a complete dentures and that minor defects in the PPS area can significantly impact the retention of the maxillary denture. By correcting the deficiencies due to an inadequate final impression, we were able to achieve a satisfactory outcome for the patient without the need for a remake or reline of the prosthesis.
Approval: N/A
Funding: N/A

100. DIGITAL DENTURES: A CASE REPORT ON INTERIM IMMEDIATE DENTURES

Carmen Chan, William Lee, Maryam Gheisarifar, Sharif Mohammad
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The fabrication of immediate dentures is an important treatment option available for patients who undergo full mouth extractions. However, in certain cases, the conventional workflow may not be the most suitable methodology. With advancements in digital dentistry, digital interim immediate dentures may be a viable alternative to conventional fabrication.
Methods: This case report outlines the digital methodologies employed for the fabrication of interim immediate dentures for a 34-year-old female with a history

of severe periodontal disease. The patient presented with complete dentition with a hopeless prognosis that prevented fabrication of conventional interim immediate dentures. Following completion of full mouth extractions, alginate impressions were taken. The alginate impressions were then scanned using an intraoral scanner (TRIOS 4) from 3shape (Copenhagen, Denmark). Subsequently, U/L record bases were designed and printed with a Sprintray 3D Printer. These record bases were then used to confirm the correct VDO of the patient. This information, along with the setting of #8 and #9 on the record base, was then used to design the final interim immediate denture. The denture was printed in 2 sectioned pieces (base and teeth) on a Sprintray 55s. The initial plan was to deliver the dentures the day of final extractions, however complications which will be further explained prevented this.
Results: The clinical outcome of the interim immediate dentures was satisfactory, meeting both functional and aesthetic expectations. A soft reline was required due to the time lapse between the impression and delivery stages, and to accommodate tissue healing. The patient was satisfied with the fit, comfort, aesthetics, and noted improved chewing function.
Conclusions: The presence of varying patient scenarios necessitates an alternative approach to the conventional workflow for interim immediate dentures. With the rise and advancement in digital technology, the integration of a digital workflow offers a synergistic approach to satisfy the esthetic and functional needs of such patients. The results demonstrate that 3D printing holds significant potential for the fabrication of immediate dentures. Further studies are required to validate these findings and explore the full potential of 3D printing in immediate denture fabrication in educational settings.
Approval: N/A
Funding: N/A

101. WITHDRAWN

102. DUPLICATING COMPLETE DENTURES USING MILLING AND 3D PRINTING

Mohammad Omair Ghory, William Lee, Swee Tan
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Integrating digital dentistry into prosthodontics has opened new avenues for streamlining clinical workflows. This case highlights the duplication of a conventionally fabricated complete denture using CAD/CAM technology, providing an efficient solution for patients with challenging clinical presentations. A 69-year-old female patient presented at the UIC College of Dentistry for the fabrication of complete maxillary and mandibular dentures. Conventional techniques were employed for the initial fabrication, which was challenging due to the patient's strong gag reflex. Modifications, such as reducing the posterior palatal area, were necessary but did not compromise the denture's retention. At a six-month follow-up, the patient reported no issues with the dentures, which demonstrated excellent adaptation and comfort. Since the current dentures are working well for the patient, it was decided to make a copy denture so as to provide the patient with backup dentures in case her existing dentures are lost or damaged. Digital workflow was used so that a digital scan file is available if any additional dentures are needed in the future.
Methods: The patient's existing dentures were scanned using a 3Shape E4 desktop scanner. The resulting STL files were processed in 3Shape software for segmentation and Dentsply software for marking the teeth and denture borders. The teeth were grouped into anterior, left, and right posterior sets. The digital files were sent to an external lab for milling and to the UIC digital lab for 3D printing. The 3D printed dentures were fabricated in separate components (teeth and denture base) and subsequently assembled.

Results: Both the milled and 3D-printed dentures exhibited excellent retention. However, with the milled dentures, moderate adjustments were made on the buccal flanges, intaglio, and occlusal surfaces, while the 3D printed required no adjustments. The digital duplication workflow demonstrates the efficacy and relative accuracy of the copy denture function of the 3Shape software.
Conclusions: This case underscores the feasibility of duplicating dentures digitally without conventional lab procedures. Digitally duplicated dentures provide patients with a backup option while ensuring a clinically acceptable replication of a functional prosthesis. Digital copy denture workflow saves time, minimizes inconvenience for the patient, and preserves STL files for future use. Notably, the 3D printed dentures were surprisingly more comfortable than the conventional dentures at the time of delivery.
Approval: N/A
Funding: N/A

103. UTILIZING INTERIM DENTURE FOR DIGITAL WORKFLOW IN AN ALZHEIMER'S PATIENT

Jocelyn Gonzalez, William Lee, Maryam Gheisarifar
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The shift towards fabricating digital dentures reflects the growing desire to improve patient care, increase clinical efficiency, and enhance the precision of prosthodontic work. By eliminating many of the challenges associated with conventional denture fabrication, such as inaccurate impressions, lengthy appointments, and labor-intensive lab work, digital dentures provide a new method that benefits both patients and dentists. Digital dentures is becoming the standard in modern prosthodontics, especially for patients with special needs or those requiring complex care.
Methods: The case report focuses on a 73-year-old female diagnosed with Alzheimer's disease, presenting with an interim immediate denture that exhibited poor retention and stability. Additionally, the patient experienced severe cognitive decline and increased difficulty following complex instructions, leading to anxiety and frustration during dental appointments. As a result, digital denture workflow was selected as a more appropriate alternative to fabricating a maxillary complete denture. The approach focused on reducing the number of visits and simplifying the overall process while still achieving high-quality outcomes in terms of fit, occlusion, and function. The methodology employed bypassed traditional methods, including taking alginate impressions, custom tray fabrication and border molding, and instead focused on utilizing the patient's current dentures. The workflow is illustrated in a flowchart.
Results: The maxillary digital complete denture demonstrated significant improvements in retention and stability compared to the patient's existing interim denture. The digital workflow allowed for a more efficient use of clinical time by eliminating the need for multiple appointments and reducing the number of procedures

required, which was especially beneficial considering the patient's cognitive and emotional impairments, as well as that of her caregiver.
Conclusions: The workflow demonstrates the feasibility and advantages of this method in addressing the unique needs of patients with cognitive impairments. The use of an existing denture as the foundation for digital complete denture fabrication in a patient with Alzheimer's disease proved to be an effective, time-saving solution that addressed the patient's unique needs. By simplifying the workflow, reducing the number of appointments, and improving retention and comfort, this approach allowed for a more efficient and less stressful treatment experience, potentially reducing chair time, and the need for multiple follow-up appointments.
Approval: N/A
Funding: N/A

104. EDENTULISM REDEFINED: DIGITAL WORKFLOWS FOR FULL-ARCH RESTORATIONS

Ruba Halasa, Dima Ghunaim, Rand F. Harlow, Bin Yang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This poster introduces a streamlined digital workflow for restoring a completely edentulous patient, transitioning from rapidly fabricated complete dentures to a full-arch implant-supported prosthesis. The process emphasizes speed, precision, and high patient satisfaction.
Methods: A fully edentulous patient with 10 pre-existing implants underwent a streamlined digital workflow. Initial steps included initial scans, designing digital trays and bite plates in 3Shape™. Border molding, final impressions and bite registration were completed in a single visit and digitized via E4-Lab Scanner. Printed tray provided excellent fit, resulting in a precise impression and integrated beams allowed for secure simultaneous bite registration. Complete dentures were designed using 3Shape™ and 3D printed with SprintRay Pro55S™, requiring minimal adjustments despite anatomical challenges. The restorations were custom stained and glazed using Optiglaze™ to achieve a lifelike finish and enhance esthetics. At implant uncovery, photogrammetry with PIC Dental® system captured implant positions, while Trios 4® was used for soft tissue scanning, enabling immediate adjustment to MUA positions based on photogrammetry feedback. Pre- and post-surgical scans were merged with the denture designs in Exocad®, where the digital dentures allowed alignment of the scans at the appropriate vertical dimension, and replication of the tooth arrangement. This enabled same-day delivery of a printed interim FCD. For the final restoration, only a soft tissue scan was necessary to fabricate the Zirconia FCD.
Results: The digital workflow reduced clinical visits for denture fabrication to two, maintaining accuracy with minimal adjustments. The interim FCD provided durability and eliminated the need for intraoral conversion, ensuring optimal results and a seamless transition to final prosthesis.

Conclusions: This case highlights the benefits of a digital workflow in full arch implant restorations, demonstrating efficiency, accuracy, and patient satisfaction.
Approval: N/A
Funding: N/A

105. DIGITAL WORKFLOW FOR INDIRECT VENEER FABRICATION: STEP-BY-STEP PROCESS

Blake Louis Harvey, Alexandra Rodriguez, Camila Zamperini, Andrea Reale Reyes
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Digital workflows in dentistry have revolutionized veneer fabrication, offering precision and efficiency. Incorporating intraoral scanning, wax-ups, provisional restorations, and a 3D-printed model for extraoral adjustments aids to minimize chairside adjustments.
Methods: This case report outlines a digital workflow for indirect veneers in a patient with discolored, uneven teeth resulting from childhood trauma and a diastema. The patient sought even incisal edges and whiter teeth, guiding the treatment approach using a combination of wax-ups to fabricate provisional restorations, and 3D printing models to aid in extraoral adjustments.
Results: The workflow began with alginate impressions for diagnostic casts. Two wax-ups were created: one preserving the diastema and another closing it. These wax-ups guided the fabrication of provisional restorations, which the patient wore for two weeks to assess esthetic and functional outcomes, particularly the decision to close the diastema. A pre-preparation scan was performed to guide the final design of the veneers. After final teeth preparations, a 3D-printed model was created for extraoral adjustments of the pre-crystallized veneers, allowing for a refined fit during final cementation. This process minimized chairside time and enhanced the accuracy of the final result, leading to improved esthetics and patient satisfaction.
Conclusions: Adopting a digital workflow for veneer fabrication offers significant advantages in clinical practice. This approach streamlines treatment, reducing chairside time, enhancing communication with patient and ultimately achieving more predictable and controllable outcomes. By using provisional restorations and 3D-printed models for extraoral adjustments, clinicians can achieve more predictable esthetic outcomes while minimizing chairside modifications. Additionally, the workflow enhances patient satisfaction by involving them in the decision-making process. As digital technology evolves, incorporating such workflows can lead to more efficient, cost-effective, and patient centered care, improving clinical outcomes and practice efficiency.
Approval: N/A
Funding: N/A

106. DIGITALLY-ASSISTED SOFT TISSUE SCULPTING AND IMMEDIATE-LOADING FP1 IN EDENTULOUS MAXILLA

Donghyun Kim, Bin Yang, Leila Ahmadian, Rand F. Harlow, Dima Ghunaim, Sandy Ku, Flavia Lakschevitz

Department of Restorative Dentistry, UIC College of Dentistry, Department of Periodontics, UIC College of Dentistry

Objectives: Recreation of anatomic gingival architecture in completely edentulous maxilla around FP1 remains a challenge. The interim FP1 presents mechanical challenge due to less bulk than FP3, and large holes created for connecting temporary abutments. Interim prosthesis fracture can be detrimental to tissue healing and osseointegration of implants. This clinical report introduces a fully digital technique to address both challenges through a quad-overlay of bone, initial and modified soft tissues, and prosthesis, and fabrication of a monolithic immediate-load interim FP1.
Methods: Records: Patient presented with maxillary complete denture and mandibular implant-supported interim prosthesis. Dual CBCT scan, intraoral scans, and extraoral photos were taken with existing prostheses. Treatment Planning: Initial soft tissue scan was modified to match FP1 design and final gingival contours. A quad-overlay of the bone, initial and modified soft tissues, and FP1 was created. Tooth-by- tooth cross sections were used to plan implant positions and tissue regeneration respecting the biologic width and crest-to-contact distance. Surgery: Guided surgery was completed with bone scalloping, prosthetic-aided implant placements, and abutment positioning. Photogrammetry was used to transfer implant coordinates. Direct-to-MUA monolithic interim FP1 milled in IvoClar TelioCAD PMMA was delivered. At 4 weeks healing, connective tissue graft was completed via tunneling technique on site 5, 6 to increase the band of keratinized tissue to correct for deficient soft tissue contours. Natural gingival architecture around the prosthesis was appreciated after 8-weeks. An IOS scan reveals close approximation to designed tissue contours. Interim printed prototype restoration was delivered at 12 weeks, and ""Step-pontics"" were created with open embrasures to allow space for coronal migration of tissues.
Results: Final printed prototype restoration was delivered at 16 weeks to match the resulting soft tissue contours, and natural gingival architecture can be appreciated, with anterior gingival zeniths at correct relative locations and growth of interdental papilla.
Conclusions: The digital quad-overlay of bone, soft tissues, and prosthetic allows for precise tooth-by-tooth planning to achieve anatomic soft tissue architecture. Photogrammetry is recommended for fabrication of mechanically superior monolithic interim FP1 for immediate loading.
Approval: N/A
Funding: N/A

107. REHABILITATION USING IPS® IMPLANTS AND FULL ARCH PROSTHESIS

Leonardo Gabriel Marquez, Leila Ahmadian, Nicholas Callahan, Ashleigh Weyh, Dima Ghunaim
Department of Restorative Dentistry, UIC College of Dentistry,
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: This clinical report aims to present a modern Individual Patient Solutions Implant® by KLS® that is now a viable alternative for patients with severely resorption when endosteal and zygomatic implants are unsuitable.
Methods: A 67-year-old female with terminal dentition and a severely resorbed maxilla sought rehabilitation. CBCT evaluation revealed generalized bone resorption, significantly pneumatized sinuses, and thin zygomatic arches. Based on clinical presentation, we opted for IPS® and a full arch prosthesis. The surgical planning was restoratively driven. Intraoral scans were captured with 3Shape Trios®. A partial tooth setup incorporating fiduciary markers was made, and a dual CBCT scan was taken. The surgical planning was done in conjunction with oral surgery and KLS® engineers. The patient underwent surgery under general anesthesia. First, remaining dentition were extracted. Second, bone reduction was performed using a reduction guide. Finally, the implant placement was secured with 18 screws, and an interim prosthesis was delivered intraoperatively. The patient was followed up consistently post operatively and is now preparing for the final zirconia prosthesis.
Results: Interdisciplinary care and high customization of IPS® Implants provided an efficient, precise, and more predictable option for this patient.
Conclusions: Subperiosteal implants have been present for almost 80 years. They were declining in popularity due to the high complexity, complications, and advancement in bone grafting procedures. However, there are patients that fail all conservative options and require more customized care. The advancements in CAD-CAM technology, CBCTs, and custom-made medical devices provide more treatment alternatives for this population of patients.
Approval: N/A
Funding: N/A

108. COMPREHENSIVE TRAINING IN ADVANCED PREDOCTORAL IMPLANT PROGRAM

Sagarkumar Patel, Quio Fang, Luis Mezzomo, Bin Yang, Betti Shahin
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The Advanced Predoctoral Implant Program (APIP) at UIC College of Dentistry provides predoctoral students with hands-on training in implant dentistry. This case series demonstrates APIP's comprehensive approach through surgical and restorative challenges, equipping students with essential skills for complex clinical scenarios.

Methods: Case 1: Surgical Training A 67-year-old female patient presented with a missing maxillary right first premolar (#4) and significant mesiodistal space limitations, precluding the use of a traditional fully guided surgical guide. An APIP student, under faculty supervision, utilized a digital workflow combining CBCT imaging and intraoral scanning to fabricate a pilot-guided surgical guide with a smaller sleeve diameter for initial drilling. The precise pilot drilling provided a foundation for freehand completion of subsequent drilling and implant placement. Case 2: Restorative Training In a second case, a patient required an implant-supported FPD. The student employed a splinting technique for impression-taking, using self-curing acrylic resin (GC resin) to stabilize the impression transfers, creating a rigid unit that minimized distortion. To counteract polymerization shrinkage, the splint was sectioned and re-splinted intraorally. Digitized casts were used to design and fabricate custom titanium abutments and monolithic zirconia restorations, which were delivered with minimal adjustments.
Results: Both cases show the APIP program's effectiveness in preparing students for complex implant dentistry. The surgical case highlighted the use of guided techniques and digital workflows for accurate implant placement in challenging scenarios, while the restorative case demonstrated advanced impression methods for precise, predictable results. APIP students displayed technical proficiency, problem-solving skills, and confidence, ensuring excellent patient outcomes.
Conclusions: This case series highlights APIP's robust training, integrating advanced surgical and restorative techniques. Through hands-on experience in guided implant placement and precise impression-taking, students gain critical skills, confidence, and problem-solving abilities, preparing them for excellence in implant dentistry.
Approval: N/A
Funding: N/A

109. IMPLANT SOLUTIONS FOR THE EXTREME WEAR PATIENT

Alena C. Poe, Sebastian Graca, Dima Ghunaim, Bin Yang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The concept of third dentition refers to the ability to replace lost or severely damaged teeth with artificial substitutes that mimic their function and esthetics. This report aims to highlight a comprehensive approach for full-mouth implant rehabilitation in a 80-year-old male patient with a history of bruxism, characterized by mutilated dentition, loss of occlusal vertical dimension (OVD), and compromised esthetics. This seamless process integrates surgical planning, guided intervention and the creation of definitive restorations to achieve functional and esthetic outcomes of the third dentition.
Methods: The treatment plan involved establishing the desired maxillary anterior tooth position and posterior esthetic plane using a wax-rim to confirm a compatible OVD. Computer-aided design and computer-aided manufacturing (CAD-CAM) technology

was utilized to create dual-arch stackable surgical guides and fabricate a polymethyl methacrylate (PMMA) full-arch provisional restoration. Guided implant osteotomy and placement were performed, followed by the immediate conversion of the PMMA full-arch provisional to implant support. A prototype derived from the optimized provisional served as a reference for fabricating the definitive milled monolithic zirconia prosthesis.
Results: The digital workflow ensured precise surgical and prosthetic procedures, resulting in a successful immediate rehabilitation with the PMMA full-arch provisional. The integration of the optimized provisional into the design of the definitive zirconia prosthesis provided precise and predictable functional and esthetic outcomes.
Conclusions: The increasing prevalence of the severely worn dentition highlights the significance of tailored treatment approaches and digital workflows in addressing severe dental wear caused by bruxism. The fusion of CAD/ CAM technology with surgical technique ensures a precise, efficient and patient centered-approach to the development of third dentition, setting a benchmark for modern restorative dentistry.
Approval: N/A
Funding: N/A

110. CAD/CAM ESTHETIC REHABILITATION OF A PATIENT WITH AMELOGENESIS IMPERFECTA

Kabila Saro Ramkumar, Hisham Gharib, Bin Yang
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Amelogenesis Imperfecta is a genetic condition where the enamel is compromised during development. This leads to accelerated tooth wear, decay, hypersensitivity, malocclusion and esthetic compromise. A restorative treatment plan was formulated to restore function and esthetics for the patient, by providing chairside CAD/CAM e.max indirect restorations.
Methods: This case report outlines the prosthetic methodologies employed for the esthetic rehabilitation of a 19-year-old female with Amelogenesis Imperfecta. In addition to using e.max crowns as the final restoration, 3D printed ceramic crowns were utilized as provisionals. Patient presented with pitted and stained anterior teeth, with existing carious lesions, and spacing.
Results: Teeth #6-11 were prepared due to patient's compromised esthetics, and existing carious lesions. Due to the defective enamel structure, restoring teeth with veneers would not be the preferred treatment choice because of the compromised enamel bonding of the veneers and the high caries risk of the patient. Furthermore, it was decided to treatment plan for chair-side CAD/CAM e.max crowns. Temporary ceramic crowns were 3D printed chairside to ensure esthetic enhancement for patient during provisionalization.

Conclusions: Amelogenesis Imperfecta is a condition requiring extensive care to preserve natural tooth structure while providing the patient with function and psychosocial benefits of an esthetic smile. It was shown to be that CAD/CAM chairside E.max crowns were conservative, durable and a predictable treatment option because of their excellent aesthetics, durability, strength, marginal fit and biocompatibility.
Approval: N/A
Funding: N/A

111. OUTCOME OF NS-RCT ON PREVIOUSLY-AVULSED TOOTH WITH LARGE PERIAPICAL LESION

Wanrong Ruan, Qian Xie
Department of Endodontics, UIC College of Dentistry

Objectives: The focus of this case report is on the management of a previously avulsed tooth, the role of early replantation, and the success of non-surgical root canal therapy (NS-RCT) in the presence of a large periapical lesion.
Methods: A 62-year-old woman presented to UIC urgent care with a chief complaint of a fetid odor emanating from her tooth. She reported a history of tooth #24 being avulsed twenty years ago, during which she replanted the avulsed tooth immediately but did not seek dental care. After two decades, the tooth became symptomatic, prompting the patient to seek care where NS-RCT was initiated but left incomplete. Upon clinical examination, a sinus tract was noted, draining from the lingual aspect of tooth #24. The tooth appears to be previously accessed with an absent temporary restoration. Endodontic clinical exam concluded a diagnosis of previously initiated NS-RCT with symptomatic apical periodontitis. Additionally, class II mobility was noted. Periapical radiographs revealed a large apical radiolucency (>5mm) suggestive of a potential through-and-through lesion. The patient provided periapical radiographs taken by an outside dentist prior to NS-RCT initiation. Non-surgical root canal therapy (NS-RCT) was performed, with inter-appointment calcium hydroxide (CaOH2) medication placement.
Results: The patient returned for an 8-month follow-up post NS-RCT, at which point the periapical lesion had nearly completely resolved. Intraoral exam noted a reduction in mobility of #24 as well as resolution of lingual sinus tract and percussion sensitivity.
Conclusions: The favorable outcome of this case was likely enhanced by the immediate replantation of the avulsed #24, which could have played a key role in preserving the tooth. This case report highlights the healing potential of non-surgical root canal treatment, even in teeth with large periapical lesions (>5mm) and thus guarded prognosis.
Approval: N/A
Funding: N/A

112. TRANSFORMING WORKFLOW EFFICIENCY THROUGH DIGITAL DENTURE TECHNOLOGY

Preshika Saini, Ana Correa, Michelle Akemi Marcano, William Lee, Maryam Gheisarifar

Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This case report aims to evaluate the impact of integrating digital workflow into the fabrication of complete dentures for edentulous patients in predoctoral dental clinics. Specifically, focusing on its effects on procedural efficiency, precision in prosthesis design, patient satisfaction, and overall workflow optimization compared to conventional methods.
Methods: This case report compared two methods of complete denture fabrication: the conventional workflow and the digital workflow. Both workflows were implemented to fabricate complete dentures for the maxillary arch and implant-supported overdentures for the mandibular arch. The parameters of the workflows were based on clinical experience and adhered to the respective guidelines outlined in the workflow diagram. Data collection included several key metrics: time required for each step, patient-reported outcomes, clinician feedback, and clinical assessments of the dentures.
Results: The digital workflow demonstrated several advantages over the conventional workflow. Time savings were observed across multiple steps, particularly in wax-rim adjustments, and trial denture fabrication including setting teeth. The digital workflow's precision resulted in superior prosthesis fit, as evidenced by fewer post-delivery adjustments compared to the conventional method. Patient-reported outcomes indicated higher satisfaction with the digital workflow, attributed to fewer appointments, shorter clinical visits, and improved comfort during procedures. Clinician feedback highlighted the enhanced efficiency and ease of incorporating digital tools into routine practice. Furthermore, the integration of computer-aided design (CAD) and computer-aided manufacturing (CAM) technology reduced communication errors between the clinician and laboratory, contributing to the reproducibility of results and ensuring high accuracy.
Conclusions: The adoption of a digital workflow in edentulous case management significantly enhances efficiency, precision, and patient satisfaction. This case report illustrates the transformative potential of digital technologies in predoctoral clinical education. By reducing clinical chair time, improving prosthesis fit, and enhancing communication between clinicians and laboratories, digital workflows offer a patient-centered approach to edentulous case management. Future studies should further explore the long-term clinical outcomes, scalability, and cost-effectiveness of digital denture workflows in educational clinical settings.
Approval: N/A
Funding: N/A

113. SUCCESSFUL MANAGEMENT OF LYMPHANGIOMA CIRCUMSCRIPTUM OF TONGUE WITH SIROLIMUS MONOTHERAPY

Allison Renella Salmon, Paige Reilly, Nicholas Callahan, Ashleigh Weyh
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry, Department of Pediatrics, Rush University Hospital, Chicago, IL

Objectives: This case report describes a six-year-old male with lymphangioma circumscriptum of the tongue, an uncommon congenital benign tumor that can cause macroglossia in children. Complications include exclusive nasal breathing, airway obstruction, impaired feeding, esthetic disfigurement, and difficulties in mastication, swallowing, and speech. The patient was treated with sirolimus monotherapy with MRI imaging to assess progress. This case is unique due to its entirely nonsurgical treatment approach. The goals of treatment were full resolution of intermittent tongue pain, no episodes of respiratory distress, and no treatment-related toxicity.
Methods: A six-year-old patient with a right-sided tongue mass extending to the floor of mouth presented to the OMFS clinic due to episodes of acute tongue swelling and pain. Biopsy confirmed the diagnosis of lymphangioma circumscriptum. Historically, treatment options have included surgery, sclerosing agent injection, and low radiofrequency ablation. Partial glossectomy has a high rate of relapse, often requires a high amount of tissue resection, and has painful, prolonged post-operative healing. Sirolimus, also known as rapamycin, is an mTOR inhibitor that targets the PI3K-AKT-mTOR signaling pathway. The mTOR pathway regulates lymphatic endothelial and valvular morphogenesis. Inhibition suppresses lymphangiogenesis and the T-cell immune response, causing atrophy and decreased growth of lymphangiomas. The patient was referred to pediatric hematology-oncology as surgical resection was not feasible without substantial morbidity. Sirolimus monotherapy was recommended as a less invasive option with a high potential for success. At one month post diagnosis, the patient began Sirolimus therapy, at 0.8 mg/m2 every twelve hours with a goal trough level of 6-10 ng/mL. Due to sirolimus' myelosuppressive effects, trimethoprim-sulfamethoxazole was prescribed for pneumocystis pneumonia prophylaxis.
Results: After three weeks on Sirolimus, the patient reported no further episodes of pain. After two months, the tongue noticeably decreased in size. The patient continued to improve clinically, with full resolution of tongue pain and no episodes of respiratory distress. MRI taken at diagnosis and six months into therapy showed significant improvement. After close to seventeen months, sirolimus therapy was discontinued. Three months off therapy, physical exam of area was unchanged, and the patient remained asymptomatic. Six months off therapy, MRI showed ongoing favorable response to treatment with no new mass or abnormal enhancement.
Conclusions: The goals of treatment were full resolution of tongue pain, no episodes of respiratory distress, and no treatment-related toxicity, which were all fully achieved. This case adds to the growing literature of successful medical management of

lymphangioma circumscriptum and is the first to report sirolimus monotherapy as an effective approach with minimal toxicity.
Approval: N/A
Funding: N/A

114. NASAL SPURS CAUSING CUFF TEARS DURING INTUBATION

Andy Shimchuk, Raza Hussain
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: Intubation and general anesthesia are a regular part of an oral and maxillofacial surgeon's practice, and it is important to be aware of related complications. The objective of this case report is to describe a rare complication encountered during repeated nasal intubation attempts and emphasize the importance of awareness and preparation for such clinical scenarios in oral and maxillofacial surgery practice.
Methods: A situation of repeated intubation attempts, which appeared non-complicated and atraumatic, occurred with a patient. On analysis of intubation equipment, both attempts at nasal intubation resulted in cuff tears on the endotracheal tube. Upon analysis of a previously obtained CT Maxillofacial scan and clinical correlation, it was seen that the patient had an isolated nasal spur in the right middle meatus.
Results: The hypothesis is that this spur caused the cuff to tear in an identical fashion during both intubations, which led to a large cuff leak and the inability to maintain appropriate tidal volumes.
Conclusions: Although rare, it is our suggestion that oral and maxillofacial surgeons as well as anesthesia providers be aware of this clinical scenario and have technical workarounds available should similar situations arise.
Approval: N/A
Funding: N/A

115. DIGITALLY-DESIGNED, PATIENT-APPROVED: A CASE REPORT ON IMMEDIATE INTERIM DENTURES

Allinah Tahir, William Lee, Maryam Gheisarifar
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The purpose of this case report is to demonstrate the effectiveness of digital workflow in designing and fabricating interim immediate denture in predoctoral clinic. Highlighting the clinical advantages of using digital techniques over conventional methods, and to assess the functional and esthetic outcomes of digitally fabricated prothesis in an educational clinical setting.
Methods: A patient with a partially edentulous maxillary arch presented for

rehabilitation with an interim immediate denture. An intraoral scan was taken using a Trios 4 scanner (3Shape, Copenhagen, Demark) with modifications made to establish a new vertical dimension due to the loss of vertical dimension. The denture was digitally designed using 3Shape Manager (3Shape, Copenhagen, Denmark), accounting for functional and esthetic requirements for the initial try-in. The trial denture was fabricated using SprintRay 3D printer utilizing Apex Denture Teeth Resin (SprintRay, California, USA). During the first clinical evaluation, the trial denture was assessed for fit, esthetics and occlusion. Adjustments were necessary due to the increased length and width of the anterior teeth. For the second try-in, face scanner (RAYFace, Ray America, New Jersey, USA) was used to optimize the alignment for enhanced esthetics. Corrections were made to the design, printed, and a second try-in was conducted to finalize the denture for optimal fit and function. After finalizing the adjustments, the completed design was sent for milling to produce the immediate denture.

Results: Computer-aided designing and manufacturing (CAD/ CAM) produced highly predictable results with the trial denture demonstrating satisfactory retention, stability and occlusion. Patient feedback was systematically integrated into the design process in a controlled and reliable manner, eliminating the need for any chairside adjustments or repeating the steps.

Conclusions: The use of a digital workflow for the fabrication of interim immediate denture demonstrates significant advantages over conventional techniques. In this case, the digital process allowed for precise customization of the prosthesis, improved efficiency through reduced chair time, and resulted in more predictable outcome and patient satisfaction. The integration of digital technology ensured accurate fit, esthetic predictability, and functional success. Adjustments made during the try-in phases highlighted the flexibility of digital workflow in addressing patient-specific needs. This case reinforces the growing role of digital technology in modern prosthodontics, offering a reliable, patient-centered approach to denture fabrication. Further studies are recommended to validate these findings and explore the full potential of CAD/CAM technology in fabricating immediate dentures in predoctoral clinics.

Approval: N/A

Funding: N/A

116. INTRAOSSEOUS NEUROFIBROMAS OF THE ALVEOLAR BONE

Jeyda Ayten Turker, Nicholas Callahan

Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: Neurofibromas are benign neural tissue tumors that can become locally aggressive. Neurofibromas are common soft tissue tumors composed of elements of the neural sheath including Schwann cells, fibroblasts, mast cells, and perineural-like cells. They can present as solitary lesions or a part of a generalized, inherited neurofibromatosis like von Recklinghausen's disease. Occurrences of this

neurofibromas in the head and neck are rare with less than 50 intraosseous lesions reported in the literature, predominantly in the mandible. The objective of this case report is to discuss two cases of a rare entity: intraosseous neurofibromas of the inferior alveolar canal.
Methods: A retrospective study of the pathological evaluation of two patients who underwent excision biopsies for the treatment of intraosseous alveolar bone neurofibromas by the Oral and Maxillofacial Surgery Department at the University of Illinois Chicago College of Dentistry and University of Illinois Health Systems over four years. Examination of clinical records, radiographs, and histopathology was performed.
Results: Both patients underwent successful resection of biopsy-proven intraosseous neurofibromas of the right inferior alveolar canal with microneurosurgical repair of the inferior alveolar nerve. Neither patient has had a recurrence and endorsed improved hypoesthesia in the distribution of the inferior alveolar nerve.
Conclusions: Intraosseous neurofibromas of the inferior alveolar canal are uncommon. Diagnosis can be challenging. Immunohistochemical staining is crucial for confirming the diagnosis.
Approval: N/A
Funding: N/A

117. AI ASSISTED DIAGNOSIS AND MANAGEMENT OF ENAMEL PEARL

Amanda Vicari, Flavia Lakschevitz
Department of Periodontics, UIC College of Dentistry

Objectives: Enamel pearls are ectopic enamel formations that can complicate periodontal conditions, potentially contributing to periodontitis. This case report presents an innovative approach for diagnosing enamel pearls and planning guided tissue regeneration (GTR) using Artificial Intelligence (AI)-assisted CBCT imaging and intraoral scanning (IOS). Integrating these advanced technologies enhances diagnostic accuracy and treatment precision, highlighting their role in managing developmental anomalies. AI complements clinical expertise, improving diagnostic capabilities and clinical outcomes.
Methods: A 54-year-old female presented with localized periodontitis involving tooth #14, complicated by an enamel pearl on the palatal root. Clinical and radiographic evaluations, including AI-assisted CBCT imaging, revealed a PD of 7mm and 4 mm two-wall infrabony defect, suggesting regenerative potential. An IOS was obtained using a Trios 4 scanner, and the PLY file was merged with the CBCT data. The AI feature in coDiagnostiX software was used to analyze the enamel pearl's morphology for precise treatment planning. The treatment plan included scaling and root planing, gingival flap surgery, enameloplasty, and GTR with a bioactive membrane and DFDBA.

Results: Integration of IOS, CBCT, and AI in coDiagnostiX allowed accurate visualization of the enamel pearl and the defect, optimizing the surgical approach. The enamel pearl was successfully removed, and enameloplasty ensured proper anatomical adaptation. The 4 mm defect was treated with DFDBA and stabilized with a membrane, achieving tension-free primary closure. Postoperative healing was uneventful, with minimal discomfort. Follow-up showed significant improvement in periodontal health, stable hard and soft tissues, and bone fill in the treated defect.
Conclusions: This case highlights the value of integrating advanced diagnostic technologies in managing complex periodontal conditions. AI, CBCT, and IOS enabled precise diagnosis and treatment planning, optimizing surgical outcomes. The coDiagnostiX software's AI feature predicted tooth morphology and the defect, facilitating accurate surgical planning. Combining enameloplasty with GTR, we successfully restored periodontal health. This case demonstrates AI's growing role in managing intricate periodontal conditions, improving the detection of developmental anomalies like enamel pearls, and supporting personalized, evidence-based treatments. AI complements clinical expertise, enhancing diagnostic accuracy, surgical precision, and regenerative outcomes.
Approval: N/A
Funding: N/A

LITERATURE REVIEWS

118. EVALUATING BIOMIMETIC AGENTS FOR ENAMEL AND DENTIN REMINERALIZATION PERMANENT TEETH

Layla Nathem Akhras, José Guilherme Neves, Majd Alsaleh
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Oral Biology, UIC College of Dentistry

Objectives: The preservation of dental hard tissues through remineralization is a key aspect of preventive dentistry, especially for early carious lesions in enamel and dentin. Biomimetic remineralization seeks to replicate natural mineralization processes using compounds that recover lost minerals. Unlike fluoride treatments, which enhance surface remineralization, biomimetic methods encourage deeper mineral integration by promoting hydroxyapatite crystal regrowth with materials like peptides, calcium phosphates, and bioactive glass. This review assesses the effectiveness of various biomimetic strategies applied in vitro to enamel and dentin surfaces.
Methods: A comprehensive literature search was conducted using the databases PubMed, NCBI, and Google Scholar. The search utilized the MeSH terms "biomimetic remineralization," "enamel," "dentin," "nanoparticles," "carious lesions," "permanent teeth," and "in vitro." Inclusion and exclusion criteria were applied, leading to the selection of 16 relevant articles for review.
Results: The studies reviewed indicate that biomimetic agents, such as self-assembling peptides and nano-hydroxyapatite, greatly enhance mineral uptake and promote the formation of hydroxyapatite crystals in both enamel and dentin. Amorphous calcium phosphate (ACP) formulations have been found effective in initiating the remineralization process, while zinc-hydroxyapatite and bioactive glass show potential for long-term stability and protection against future demineralization. In vitro models consistently demonstrate that biomimetic agents lead to greater remineralization compared to traditional fluoride treatments.
Conclusions: Biomimetic remineralization techniques represent a promising non-invasive approach to restore enamel and dentin integrity, particularly in early carious lesions. The reviewed in vitro studies confirm the efficacy of these agents in promoting remineralization. However, further research is needed to validate these findings in clinical settings and to establish protocols for practical applications in restorative dentistry.
Approval: N/A
Funding: N/A

119. ACCURACY OF STATIC COMPUTER-ASSISTED IMPLANT SURGERY IN EDENTULOUS PATIENTS

Rafia Awais, Tarla Oliveira, Patricia Pauletto, Gabriela Sabatini, Vinicius Dutra, Rangel Lidani, Luis Mezzomo

Department of Restorative Dentistry, UIC College of Dentistry,
Departamento de Odontologia, Universidade Federal de Santa Catarina,
Florianópolis, Brazil,
Faculty of Dentistry, Universidad de Las Americas, Quito, Ecuador,
University of Bern, School of Dental Medicine, Department of Reconstructive
Dentistry and Gerodontology, Bern, Switzerland,
Indiana University School of Dentistry, Indianapolis, Indiana

Objectives: To answer the following focused question: "In full arches, what is the accuracy of dental implants placed utilizing static computer-assisted implant surgery (s-CAIS) compared to freehand implant surgery?".
Methods: A comprehensive literature search was performed. Two independent and calibrated reviewers selected studies based on pre-defined eligibility criteria and extracted data on study-, population-, intervention- and outcome (accuracy) characteristics. Risk of bias and the quality of evidence assessments of the included articles were performed by an independent and blinded reviewer. The meta-analysis used the random-effects model at a 5% significance level.
Results: Thirty (5 RCTs, 18 CCTs, 3 Cohort, and 4 Case Series) studies met the inclusion criteria and were included. Overall, 2,056 implants distributed among arches in 415 patients were assessed. Random-effects meta-analysis revealed statistically significant mean horizontal linear distortions at the implant neck and apex levels of 1.18mm (95% CI: 1.00 - 1.35) ($p < 0.001$) and 1.46mm (95% CI: 1.22 - 1.69) ($p < 0.001$), respectively, significant mean vertical linear distortion at the implant depth level of 0.58mm (95% CI: 0.18 - 0.98) ($p < 0.001$) and significant mean angular distortion of 3.65º (95% CI: 2.97 - 4.33) ($p < 0.001$). Accuracy did not differ significantly between maxilla and mandible at all parameters assessed ($p > 0.05$).
Conclusions: The accuracy of static computer-assisted implant surgery (s-CAIS) in edentulous patients is within a clinically acceptable range, and a 2-mm horizontal and 1-mm vertical safety margin should always be respected in planning.
Approval: N/A
Funding: N/A

120. ORTHODONTIC APPLIANCES AND LONGITUDINAL ORAL MICROFLORA COMPOSITION IN VIVO

Rafal M. Balut, Russell Pesavento, Austin P. Foster, Linda M. Kaste
Department of Oral Biology, UIC College of Dentistry,
Private Practice, Des Moines, IA

Objectives: A 2021 Cochrane Review conveyed that malocclusion, particularly crowding, is a significant population burden. Given the extensive potential of orthodontic therapy impact, this review seeks to address the following research question: how does the oral microflora change with the intervention of orthodontic appliances, including does the microflora revert to previous status post therapy?

Methods: A 2024 systematic review concluded that individuals undergoing orthodontic therapies experienced changes in their oral microflora. However, this article did not place emphasis on longitudinal data, especially for changes in the microflora post-therapy. The complexity of the topic and research studies led to the conduct of a modified systematic review. Using a 2017 review highlighted by the 2024 review, papers citing it as identified in PubMed were evaluated for consideration of recent research. On January 6, 2025, 27 papers had cited the 2017 systematic review. These abstracts were reviewed for relevance, from which 18 papers were selected for further consideration via the actual papers, which lead to final pertinent paper identification of 3 reviews and 7 original research studies.
Results: All 10 papers were from outside the United States. Among the original research papers, the number of time points ranged from 2 to 6 (mean 3.1), with most focusing on microflora changes in early therapy and only one with post-therapy. Studies were limited by small sample sizes, unclear demographics, different age groupings (1 pre-puberty, 1 teenage, 3 young adult, and 2 missing age data), variance on manner of assessing the microflora (3 plaque, 3 saliva, 1 both) and general lack consideration of other risk factors such as smoking or oral hygiene. Different orthodontic appliances (5 fixed, 1 clear aligner, 1 maxillary expander) yielded consideration of different microflora changes, generally at early phase, with only 1 fixed appliance study considering post-therapy (immediately after appliance removal). The review papers varied in quality with only one following the PRISMA checklist. That 2021 review suggested caution in its findings' interpretation due to limited number of studies (all moderate quality) that orthodontic treatment transitorily affects the composition of subgingival microbiome and differences in the shift by use of plaque or saliva and by type of orthodontic treatment. The 2024 review focused on clinical implications concluded that potentially harmful bacteria increase during orthodontic treatment and effective plaque control is needed to reduce the increased risk of disease.
Conclusions: Given the extensive use of orthodontic therapy and its potential for microflora changes, albeit that it is potentially transitory, the limited number of studies assessing longitudinal impact was surprising and unconclusive, especially for the lack of studies in the United States and the one study measuring after appliance removal did so immediately.
Approval: N/A
Funding: N/A

121. SILVER DIAMINE FLUORIDE AND MOLAR HYPOMINERALIZATION

Kathy Bedasee, Evelina H. Kratunova, Camilla A. Zamperini, Majd Alsaleh, Sahar Alrayyes, Christine D. Wu, Azza Tagelsir Ahmed
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: To review the current literature for studies evaluating the effect of Silver Diamine Fluoride (SDF) on hypomineralized enamel.
Methods: A search using the PubMed database was conducted using the MeSH terms "Molar Hypomineralization", "silver diamine fluoride", "fluoride", "enamel" and "color". This resulted in 51 articles. Search included English only studies published between 2014 and 2025. Five articles were selected for final review after excluding ineligible studies.
Results: The search yielded three clinical trials and one retrospective study examining the effect of SDF or SDF combined with Glass Ionomer (SDF+GI) on teeth affected with Molar Hypomineralization (MH). A cross-sectional survey evaluating parental acceptance of SDF application on teeth with MH was also included. In all reviewed randomized clinical trials (RCTs), SDF alone or with GI was significantly associated with lowered Schiff Cold Air Sensitivity Scale scores at all tested time points. The caries preventive effect was significantly higher in hypomineralized molars with incipient caries treated with SDF+GI than in teeth treated with SDF alone at 2- and 3-year studies. None of the reviewed studies evaluated change in mineral density or enamel breakdown in hypomineralized enamel treated with SDF but one RCT reported significant surface area change in hypomineralized molars treated with SDF+GI when compared to teeth treated with GI alone. Color change was not significantly different at 3, 6 or 12 months in a retrospective analysis of hypomineralized molars treated with SDF+GI. Parents of children with MH treated with SDF reported high satisfaction levels about color change associated with SDF.
Conclusions: The outcome of the review revealed that SDF has an established effect on hypersensitivity associated with MH, but no similar caries preventive effect when applied alone. There was scarce data on the ultrastructural characteristics of hypomineralized enamel treated with SDF limiting our comprehension of the favorable effect of SDF for management of teeth with MH.
Approval: N/A
Funding: UIC Pediatric Dentistry Department

122. SCOPING REVIEW OF MANDIBULAR NERVE INJURIES IN SAGITTAL SPLITS

Andrew Bertagna, Michael Miloro
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: The sagittal split osteotomy (SSO) allows for correction of mandibular skeletal defects with optimal and predictable outcomes. However, it carries high risk of IAN injury. The reported incidence of neurosensory disturbance (NSD) at one month post op ranges anywhere from 80-100%. 1 to 2 years after surgery, incidences of NSD range from 0-85%. With such a wide range, certain confounds must have a significant role in whether NSDs develop. In this scoping review we aimed to assess the existing body of literature as well as the evidence surrounding what confounders contribute

most significantly to IAN NSD after SSO.
Methods: Mesh terms were used to conducted electronic searches in Pubmed and Embase for articles in English published after 12/31/1999. The studies were examined at the title/abstract as well as full-text levels using various exclusion criteria. The remaining studies were assessed for number of nerves included, study design, how neurosensory outcomes were measured, what confounding variable were included in their analysis as well as the statically significance impact of each confounder on NSD.
Results: 49 articles included: 31 prospective cohort, 3 randomized control trials, 10 meta-analyses and 5 retrospective case control studies. 11031 nerves. All 49 included studies stratified incidence of NSD by some combination of confounders. Only eight studies included >3 confounders. 31 studies examined two or less confounders. Confounders most often associated with statically significant increases in NSD at one year were: age (12/49), intraoperative nerve manipulation (8/49), magnitude of movement (6/49), method of fixation (6/49), type of deformity (5/49) and gender (5/49).
Conclusions: 49 articles included: 31 prospective cohort, 3 randomized control trials, 10 meta-analyses and 5 retrospective case control studies. 11031 nerves. All 49 included studies stratified incidence of NSD by some combination of confounders. Only eight studies included >3 confounders. 31 studies examined two or less confounders. Confounders most often associated with statically significant increases in NSD at one year were: age (12/49), intraoperative nerve manipulation (8/49), magnitude of movement (6/49), method of fixation (6/49), type of deformity (5/49) and gender (5/49).
Approval: N/A
Funding: N/A

123. EFFECTIVE LOCAL ANESTHESIA TRAINING MODELS IN DENTAL SCHOOL EDUCATION

Edilberto Castillo, Lianna Chacon, Nicholas Callahan, Ashleigh Weyh
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: Local anesthesia (LA) education in dental schools often lacks depth and hands-on experience, which leaves students underprepared for complex procedures. Insufficient training not only risks ineffective pain management but also increases the potential for serious complications, such as permanent paresthesia, particularly with procedures like the inferior alveolar nerve block. Enhancing the quality of LA instruction is essential to ensure students' competency, patient safety, and the overall standard of care in dental practice. The objective of this study was to answer the research question: in a cohort of preclinical dental students learning to administer local anesthesia, do those that have additional preclinical hands on training sessions, compared to those with didactic only, perform better on their first injection in the domains of skill knowledge and confidence?

Methods: A systematic review was performed, following Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines. This study is IRB-exempt. Included papers compared evaluated preclinical dental students, had an experimental hand on group and a didactic only control group, and evaluated training of the inferior alveolar nerve block. The primary outcome was student confidence, and secondary outcomes were student knowledge, and ability to deliver a less painful injection.
Results: The initial search of three databases resulted in 1243 studies. After applying the inclusion/exclusion criteria, the search resulted in nine total studies. These studies evaluated 671 preclinical students, where 322 of them underwent additional hands-on training prior to first injection. All studies utilized an anatomical simulation model, however additionally one study utilized a haptic feedback model, and another utilized augmented reality/virtual reality. All studies showed superior results in the experimental hands on groups, pertaining to the domains of skill, knowledge, and confidence, however many results were not statistically significant. Significant results were seen for the experimental group in confidence levels in five studies, skill in four studies, and knowledge in two studies.
Conclusions: Additional hands-on LA training in pre-clinical education can positively impact students' confidence, skill, and baseline knowledge. While not all results were statistical significance, the positive trends observed across studies underscore the value of experiential learning in preparing students for patient care. These findings support the integration of more hands-on training sessions in dental curricula to better equip students for safe and effective local anesthesia administration.
Approval: N/A
Funding: ADEA

124. THE INFLUENCE OF SCREEN TIME ON ADOLESCENT DIETARY CHOICES

Celine Chuapoco, Majd Alsaleh
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: Adolescence marks a critical period in establishing healthy eating habits. Given the increasing prominence of digital technology, adolescents are becoming more immersed in screen-based activities, which potentially impact their dietary behaviors. Existing research has demonstrated a link between prolonged screen time and less desirable dietary outcomes such as an increased consumption of fast food, unhealthy snacks, sugary beverages, while decreasing fruit and vegetable consumption. This literature review aims to systematically analyze literature on studies investigating the influence of increased screen time on adolescent dietary behaviors.
Methods: A comprehensive literature search was conducted using Google Scholar and PubMed databases. MeSH terms such as "adolescent," "diet," "cross-sectional studies," "screentime" or "smartphone" were used. Specifically defined inclusion and exclusion criteria were applied, and 21 articles were selected for the final detailed

review.
Results: In recent decades, adolescents have significantly increased their screen time, a trend that poses potential risks to various aspects of their well-being, particularly their dietary habits. Research indicates that prolonged screen time, commonly defined as exceeding two hours per day, is associated with an overall decline in diet quality, including decreased consumption of fruits and vegetables, skipping breakfast, and a higher frequency of consuming sweetened beverages.
Conclusions: Screen time, a sedentary activity, disrupts adolescents' dietary habits, leading to unhealthy patterns like skipping breakfast, frequent fast-food consumption, and increased intake of sweets. However, current research fails to address the underlying mechanisms that drive this association and fails to distinguish between several types of screens such as television, smartphones, and tablets, which can have different effects on dietary behaviors. Future studies should examine public health interventions to address the impact of excessive screen time to improve adolescent dietary habits and promote healthier lifestyles.
Approval: N/A
Funding: N/A

125. EFFECTIVENESS OF ICON RESIN INFILTRATION IN PRIMARY TEETH WITH INCIPIENT CARIES

Bilyana Daskalova, Camila A. Zamperini, Majd Alsaleh, Christine D. Wu, Azza Tagelsir Ahmed, Sahar Alrayyes
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: This literature review explores the effectiveness of Icon resin infiltration as a treatment modality for incipient caries lesions in primary teeth. Given the high prevalence of untreated dental caries in children and the anxiety surrounding traditional dental treatments, the review aims to determine if Icon resin infiltration could provide a non-invasive, effective solution to arrest early-stage caries and prevent further progression in primary dentition.
Methods: A comprehensive literature search was conducted using PubMed and Google Scholar with MeSH terms ""Icon,"" ""primary teeth,"" ""resin infiltration,"" and ""incipient caries". Studies were selected based on inclusion criteria: full-text articles focused on primary dentition, excluding those that pertain solely to permanent teeth, animal studies, or those without access to complete articles. After filtering, 18 studies were assessed. 12 of those were excluded due to their focus on permanent dentition or unrelated factors. The remaining studies included 3 in vitro studies, 2 systematic reviews, and 1 randomized controlled trial (RCT). These studies were analyzed to evaluate the effectiveness of resin infiltration.
Results: The reviewed studies consistently indicated that resin infiltration is an effective method to halt the progression of incipient caries in primary teeth. In vitro

studies demonstrated superior microhardness in treated lesions compared to other remineralization treatments such as fluoride varnish or amorphous calcium phosphate (ACP). Additionally, in one RCT, resin infiltration combined with fluoride varnish showed significantly less progression of proximal caries compared to fluoride varnish alone. However, the high cost of the material was identified as a barrier to widespread use. Most studies included in both systematic reviews focused primarily on the permanent dentition, and there was a lack of long-term follow ups in in vivo research addressing the primary dentition.
Conclusions: Resin infiltration emerges as a promising and effective treatment for incipient caries in primary teeth. Its use results in higher microhardness of enamel when compared to remineralization techniques and may provide a non-invasive alternative to traditional dental interventions, particularly for anxious children. However, the higher cost of the treatment and limited long-term studies on primary dentition are important considerations. Further research, particularly in vivo studies with extended follow-up, is necessary to fully assess the longevity and clinical applicability of Icon resin infiltration in primary the primary dentition.
Approval: N/A
Funding: N/A

126. BIOMECHANICHAL PATHWAYS CONTRIBUTING TO ORAL SQUAMOUS CELL CARCINOMA

Avin Hafedi, Mateusz S. Wietecha
Department of Oral Biology, UIC College of Dentistry

Objectives: Oral squamous cell carcinoma (OSCC) arising from the mucosal epithelium accounts for more than 90% of oral cancers. During tumorigenesis, extracellular matrix (ECM) and many cell types within the tumor microenvironment (TME) constantly interact to provide biochemical and physical support. Solid stress, hypoxia, and other tumor metabolism products lead to the generation of cancer-associated fibroblasts (CAFs) in the TME. These cells produce cytokines and ECM products, generate physical forces, and contribute to ECM stiffness. In recent years, the influence of ECM stiffness within the TME on cancer development and progression has gained interest. Here, we review the literature for the latest studies on OSCC biomechanical properties and how they impact OSCC pathogenesis.
Methods: A search using NCBI PubMed database was conducted using the terms "mechanotransduction," "matrix stiffness," and "oral cancer." Non-peer-reviewed articles, editorials, case reports, and articles without mechanistic insights into OSCC were excluded. Primary research studies published in the last 10 years were prioritized for the review.
Results: The findings of this literature review provide comprehensive insights into OSCC behavior in response to its biomechanical TME. These findings were made possible by advances in cell culture models, with recent studies utilizing tumor

spheroids and other 3D models to recreate the cell-to-cell and cell-to-ECM TME interactions, cell morphologies, multi-cellular structures, and physiological functions of OSCC. Biomechanical signals induced by ECM stiffness can impact the course of tumor cell proliferation and tumor growth. The mechanosensitive ion channel PIEZO1 regulates oral epithelial cell crowding and division, and the mechano-sensitive calcium-permeable nonselective cation channel TRPV4 regulates OSCC tumor growth. The ratio of NET4 protein levels to laminin molecules in the basement membrane of OSCC determines the tumor's stiffness, with greater NET4 leading to a softer basement membrane and a decrease in tumor progression. Tumor cell migration is impacted by CAF-mediated matrix stiffness, and CAFs stimulate OSCC cells to produce WNT7A, contributing to OSCC invasion. Lysyl oxidase, which initiates covalent cross-linking of collagen and elastin in the ECM, co-localizes with CAFs and its expression is strongly associated with OSCC malignancy and poor prognosis. The alteration of the OSCC TME, including cytoskeletal rearrangement and matrix remodeling via the RhoA-YAP pathway in CAFs, modulates OSCC invasion.
Conclusions: Biomechanical signals induced by CAF-mediated matrix stiffness can impact the course of OSCC cell proliferation, morphology, and level of invasiveness. Although many unanswered questions remain, our review reveals biomechanical regulatory factors unique to oral cancer.
Approval: N/A
Funding: NIH R35 GM154921

127. CAREGIVER ORAL HEALTH LITERACY AND PEDIATRIC FLUORIDE USE

Amber Hanson-Dansby, Brittaney Hill, David Avenetti, Leda Mugayar, Bhakti Desai, Scott Tomar, Lisa Rawle
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: Review the scientific literature on the relationship between caregiver oral health literacy (OHL) and fluoride-related behaviors, including fluoride hesitancy, adherence to pediatric oral health recommendations, and their implications for early childhood caries (ECC). Identify gaps in the research and propose areas for future investigation.
Methods: We conducted a comprehensive search in PubMed was conducted using the terms "oral health literacy," "fluoride hesitancy," "early childhood caries prevention," and "parental oral health behaviors." Studies were selected based on inclusion criteria that focused on caregivers' oral health literacy and its impact on pediatric oral health outcomes.
Results: A total of eight studies met the inclusion criteria and were reviewed. Out of the eight studies reviewed, two were randomized controlled trials (RCTs), one was a prospective cohort study, four were cross-sectional surveys, and one was a scoping review. Findings suggest that caregiver OHL is strongly associated with pediatric

oral health behaviors, including the correct use of fluoride toothpaste, supervision of brushing, and adherence to professional dental recommendations. Studies found that higher caregiver OHL was associated with preventive fluoride use in children while lower OHL was associated with fluoride hesitancy. Sociodemographic factors, such as income, education, and geographic location were associated with OHL and oral health behaviors. Interventions targeting OHL, including health initiatives, were identified as promising tools for improving caregiver practices, although long-term efficacy remains unknown.
Conclusions: Caregiver oral health literacy may be a critical determinant of pediatric oral health outcomes, particularly in the context of fluoride use. Addressing gaps in OHL through tailored educational programs, public health policies, and systemic interventions can reduce disparities in oral health outcomes. Future research should focus on assessing the long-term impact of interventions and exploring additional demographic and cultural factors influencing caregiver OHL.
Approval: N/A
Funding: Colgate-Palmolive Co #00805703

128. INTEGRATING ARTIFICIAL INTELLIGENCE INTO DENTAL EDUCATION: APPLICATIONS, IMPACTS, AND CHALLENGES

Syeda Madiha Batool Jaffari, Toleen Mazloum, Betti Shahin
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Artificial Intelligence (AI) stands at the forefront of technological advancement, enabling the development of intelligent systems that replicate human cognitive processes. In dental education, AI revolutionizes learning and clinical training through tools such as machine learning and virtual simulations. This review discusses the current applications of AI in dental education, its potential impact on student learning and clinical practice, and the challenges of integrating these technologies.
Methods: Conducted a comprehensive literature search across the following academic databases: PubMed, IEEE Xplore, ScienceDirect, and Google Scholar. Used keywords such as "Artificial Intelligence in dental education," "AI in dentistry," "AI applications in medical training," "AI challenges in dental education," and "dental training technology." Considering specific inclusion and exclusion criteria, developed a structured data extraction form to capture essential details from each study, including publication details, study design, AI applications outcomes, benefits, and reported challenges.
Results: AI has transformed dental education by leveraging tools like personalized learning platforms, intelligent tutoring systems, and machine learning-driven diagnostics. These technologies accelerated student learning, boosted diagnostic precision, enhanced advanced practical skills, and improved clinical decision-making, resulting in significantly better educational outcomes.

Conclusions: Artificial intelligence plays a significant role in dental education through diagnostic precision, modified dental learning, and effective treatment planning. These advancements result in more efficient training for future dental professionals. However, institutions must address the challenges of cost, equitable access, curriculum adaptation, ethical concerns, and resource allocation in order to implement AI in a way that complements traditional education rather than replacing essential skills. Strategic planning and thoughtful considerations are essential for the successful implementation of AI, ensuring its full potential is realized. As the dental profession evolves, AI is poised to become a vital tool in shaping the education of future dentists, equipping them to navigate the demands of a digital-driven healthcare environment.
Approval: N/A
Funding: N/A

129. ASSESSING OHRQOL AND INTERCEPTIVE ORTHODONTICS IN THE PEDIATRIC POPULATION

John Kraynik, David Avenetti, Brittaney Hill, Veerasathpurush Allareddy, Bhakti Desai
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Orthodontics, UIC College of Dentistry

Objectives: Early intervention for skeletal and dental malocclusions using interceptive orthodontics can reduce the complexity of future orthodontic treatment. This review aims to evaluate the literature for studies investigating the relationship between interceptive orthodontic treatment and Oral Health-Related Quality of Life (OHRQOL) in the pediatric patient population.
Methods: A search using the PubMed/MEDLINE and Scopus database was performed using the MeSH terms "interceptive orthodontics," "dentition, mixed," "outcome," and "orthodontic treatment." Non-English studies and those examining the adult population were excluded. After reviewing abstracts, five articles were selected for full review based on relevance and applied inclusion/exclusion criteria.
Results: Interceptive orthodontic treatment successfully treated a wide range of skeletal and dental malocclusions in the pediatric population, such as anterior and posterior crossbites, ectopic eruption, impacted teeth, crowding, rotated teeth, and midline deviations. Noticeably missing from the reviewed articles were studies evaluating OHROoL in mixed dentition patients with malocclusions and interceptive treatment's effects on OHRQoL. All articles focused on evaluating objective clinical outcomes without assessing subjective improvements to OHRQoL, indicating a significant gap in the literature and potential for future research.
Conclusions: Appropriate interceptive orthodontics can have good short-term and long-term clinical outcomes. Interceptive orthodontics improves oral function and may simplify future orthodontic treatment. However, there is a gap in the literature regarding the subjective improvements from interceptive orthodontics, specifically OHRQoL (oral function, orofacial pain, orofacial appearance, and

psychosocial impact). Additional research is needed to investigate the relationship between interceptive orthodontics and OHRQOL. A better understanding of which malocclusions and treatments lead to meaningful improvements in both function and quality of life will provide stronger evidence for clinical decision-making in the mixed dentition stage.
Approval: N/A
Funding: N/A

130. IMPACT OF INTERCEPTIVE ORTHODONTIC TREATMENT ON OHRQOL

LaFonte' Krushall, Brittaney Hill, David Avenetti, Veerasathpurush Allareddy, Bhakti Desai

Department of Pediatric Dentistry, UIC College of Dentistry, Department of Orthodontics, UIC College of Dentistry

Objectives: To review the literature for studies evaluating the impact of interceptive orthodontic treatment on childrens' oral health related quality of life (OHRQoL). This review seeks to understand if an objective improvement in a patient's occlusion is matched by a perceived subjective improvement in OHRQoL.
Methods: Scoping review using Scopus and Embase databases with the following MeSH terms "quality of life", "interceptive orthodontics", "childhood", and "malocclusion" identified 1,084 articles. All eligible articles were reviewed according to inclusion and exclusion criteria. Eight articles met the criteria for full review and were reviewed fully.
Results: Interceptive orthodontic treatment included treatment for anterior open bite, crossbites (anterior and posterior), and functional appliances for class 2 malocclusions for patients between the ages of 7-11. Results showed interceptive orthodontic treatment improves OHRQoL. Treatment duration and type of interceptive orthodontic treatment impacted OHRQoL. Transient deterioration in OHRQoL was noted to be related to soreness and physical discomfort related particularly to palatal expansion.
Conclusions: Malocclusion in the mixed dentition phase can have a negative impact on OHRQoL. Children may require more complex orthodontic treatment for malocclusions left untreated in the mixed dentition phase. While type of treatment rendered, treatment duration, and malocclusion type are implicated in OHRQoL, additional research is needed to better understand the relationship between interceptive orthodontic treatment and OHRQoL.
Approval: N/A
Funding: N/A

131. EXPLORING THE DENTAL CARE EXPERIENCES AMONG CHILDREN WITH G6DP DEFICIENCY

Marrisa Lee, Brittaney Hill, Bhakti Desai, Lisa Rawle
Department of Pediatric Dentistry, UIC College of Dentistry

Objective: Glucose-6-phosphate dehydrogenase (G6PD) deficiency is the most common enzyme deficiency worldwide. G6PD can complicate medical and dental care through its susceptibility to oxidative stress. The purpose of this review was to (1) assess existing literature exploring oral health outcomes for children with G6PD deficiency and (2) identify prospects for future research.
Methods: A search using PubMed database was conducted using the keywords "G6PD deficiency" AND "children" and the MeSH terms "oral health care", "dental care", "parental perceptions" and "disparities." Articles were selected according to specifically defined inclusion and exclusion criteria. The search yielded nine articles, and five were selected for full review.
Results: Research shows that improper management of individuals with G6PD deficiency can progress to acute hemolytic anemia, which may lead to permanent neurological damage or even death. A cross-sectional study assessed potential for hemolysis following analgesia use but noted the study's limited insight on the patient and parent perspective as well as perioperative management.
Conclusions: There is a clear need for specialized training in managing pediatric patients with G6PD deficiency, especially in the dental setting. Studies do not fully explore how G6PD deficiency affects oral health, leaving a gap in knowledge. To improve care, further research is needed to create more effective strategies to manage patients with G6PD in dental settings.
Approval: N/A
Funding: N/A

132. TOOTHBRUSH DIARIES: EVALUATING THEIR EFFECTIVENESS IN IMPROVING ORAL HYGIENE

Ryan Lee, Evelina H. Kratunova, Leda Mugayar, Scott Tomar, Flavia Lamberghini
Department of Pediatric Dentistry, UIC College of Dentistry

Objective: This literature review aimed to explore the feasibility, acceptability, and behavioral impact of toothbrush diaries as tools for improving oral hygiene. It also sought to identify gaps in research, with a particular focus on pediatric populations.
Methods: A systematic review of the literature was conducted using Google Scholar, NCBI, and PubMed databases. The search utilized MeSH terms such as "Oral Hygiene" and "Toothbrushing," along with keywords like "diary," "logger," and "tracker." Inclusion criteria focused on studies that assessed the use of toothbrush diaries across different populations. Studies unrelated to diary interventions were excluded. A total of eight studies met the selection criteria and were included in this review.

Results: The review showed that toothbrush diaries are practical and motivating tools for promoting better oral hygiene. Compliance rates ranged from 50% to 100%, depending on factors such as external support and intervention type (Miller et al., 2007; McCracken et al., 2005). Participants frequently reported increased awareness of their oral health behaviors. However, objective data from loggers showed that only 69% of participants adhered to the recommended brushing duration, despite 98% self-reporting compliance (McCracken et al., 2005). Clinical improvements, including reductions in plaque levels and gingival bleeding, were also documented (Suresh et al., 2012). Importantly, none of the reviewed studies addressed the use of toothbrush diaries in pediatric populations, highlighting a research gap. Given that children often rely on caregiver support for oral hygiene, this gap warrants further research.
Conclusions: The reviewed literature suggests that toothbrush diaries are feasible and effective tools for enhancing oral hygiene behaviors. However, the absence of pediatric-focused studies points to an important area for future research. Further investigations should assess the effectiveness of toothbrush diaries in children and explore the role of caregiver involvement in improving pediatric oral health outcomes.
Approval: N/A
Funding: N/A

133. EFFICACY OF CURODONT™ IN MANAGING INCIPIENT CARIES IN PRIMARY TEETH

Yi-Ling Akiho Loo, Camila Zamperini, Majd Alsaleh, Azza Ahmed, Christine D. Wu, Evelina H. Kratunova
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Curodont™ is a low-viscosity liquid composed of self-assembling peptide (SAP) P11-4 monomers which form a fibrillar scaffold when applied to carious lesions. Calcium, phosphate, and fluoride ions from saliva precipitate within the peptide matrix, leading to de novo hydroxyapatite crystal formation and biomimetic enamel regeneration. This review aimed to examine the existing literature on the efficacy of Curodont™ in managing caries in primary teeth and to identify prospects for future research.
Methods: A search using the PubMed database was conducted using the keywords "Curodont AND primary teeth" and the MeSH terms "biomimetic materials", "dental caries", "peptides", and "tooth remineralization". Specifically defined inclusion and exclusion criteria were applied, and 3 articles were selected for the final detailed review.
Results: In an in vitro study by Ozdemir et al. (2022) Curodont™ was shown to remineralize secondary carious lesions more effectively than lesions treated with fluoride varnish. In contrast, the in vitro study conducted by Wahba et al. (2022) found an increase in mineral loss and lesion depth in comparison to fluoride varnish when

Curodont™ was used to prevent and arrest carious lesions. However, these results may have been due to an inaccurate simulation of clinical conditions. Finally, the clinical trial conducted by Natchiyar et al. (2023) assessing the effects of remineralizing agents in management of white spot lesions in three to five-year-old children found that Curodont™ showed greater efficacy than fluoride varnish.
Conclusions: The reviewed literature suggests that Curodont™ shows potential as a biomimetic agent for managing early carious lesions in primary teeth. However, the evidence remains limited and inconclusive. The conflicting findings show the need for further in vitro studies that better replicate clinical conditions and for well-designed clinical trials to validate the clinical applicability of Curodont™ in pediatric dentistry.
Approval: N/A
Funding: N/A

134. 3D PRINTED RESTORATIVE MATERIALS: ARE THEY THERE YET?

Shahd Louaibi, Andrea Reale, Camila Zamperini, Alexandra Rodriguez
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: The primary objective of this literature review is to compare 3D Printed vs milled restorative materials indicated for tooth supported indirect restorations (veneers, inlays/ onlays, and crowns). The analysis of the literature will yield comparisons of the different properties of ceramics and hybrids such as marginal fit / adaptation, secondary caries progression, efficiency, fracture resistance, filler weight percentage, enamel wear, mechanical properties (such as flexural strength and modulus), surface properties (staining), and physical properties (hardness).
Methods: The literature review was conducted using PubMed Search with the following MeSH Terms: "3D Printed Indirect Restorations", "Milled vs 3D Printed CAD:CAM": "3D Printed Intracoronal Restorations", "Properties of 3D Printed Restorations". The review yielded ~10 articles with the inclusion criteria being articles in English, articles written in the last 5 years, and articles dealing with indirect restorations. Exclusion criteria included articles written in other languages, older articles, and articles investigating the properties of 3D printed removable materials (partial dentures and dentures). The materials included for comparison in this search were lithium disciliate, hybrid ceramics, and resin composites.
Results: According to the literature, printed restorative materials have promising properties including superior marginal adaptation and fit compared to milled restorations. Some of their physical and mechanical properties show lower performance compared to milled restorations such as lower resistance to staining in in-vitro studies. More in-vivo studies are necessary to investigate their behavior and long-term success but the limited in-vitro studies available demonstrate that 3D printed restorative materials have similar or superior properties when compared to the more traditionally used milled restorative materials.

Conclusions: Although 3D printed materials are readily available and advertised to be used as permanent restorations, there is a lack of publications that show their properties and potential clinical outcomes. This literature reviews aims to increase clinicians' confidence in the inherent properties of 3D printed intracoronal restorative materials.
Approval: N/A
Funding: N/A

135. MAXILLARY AND MIDFACE RECONSTRUCTION

Ian Mahone, Jeyda Ayten Turker, Ashleigh Weyh, Nicolas Callahan
Department of Oral and Maxillofacial Surgery, UIC College of Dentistry

Objectives: Maxillary reconstruction restores form and function in patients with defects from trauma, pathology, or congenital conditions. This review examines surgical and non-surgical approaches to optimize patient outcomes, focusing on bone grafting, implant planning, immediate reconstructions, various flap techniques, and advanced technologies. This review aims to guide clinicians in selecting appropriate reconstructive methods that balance functional and aesthetic outcomes through a multidisciplinary approach.
Methods: This analysis reviewed articles examining surgical interventions (bone grafting, local/regional flaps, osteocutaneous free flaps), non-surgical options (obturators), and advanced technologies (digital planning, personalized implants). We evaluated each approach's effectiveness in achieving immediate, personalized maxillary reconstruction. Our literature search utilized Google Scholar, PubMed, and the UIC online library with these keywords: maxilla, maxillary midface reconstruction, maxillofacial abnormalities, microsurgical free flap, maxillofacial prosthesis, bone graft, jaw in a day, and zygomatic implants.
Results: Bone grafting and implant planning show consistent success in functional restoration. While immediate reconstructions expedite recovery, they demand surgical precision. Local flaps effectively address smaller defects, whereas free flaps better suit extensive reconstructions. Obturators remain valuable for non-surgical candidates. Modern techniques like ""Jaw in a Day"" and patient-specific implants enhance precision and patient satisfaction while reducing complications.
Conclusions: Successful maxillary reconstruction requires a patient-centered, multidisciplinary approach. The integration of traditional techniques with modern technologies optimizes recovery times and outcomes. Personalized solutions consistently deliver superior long-term results, establishing them as crucial elements in contemporary maxillofacial reconstruction.
Approval: N/A
Funding: N/A

136. HOW LIMITED ACCESS TO HEALTHY FOOD IMPACTS CHILDREN'S BMI

Andres Rudolfo Martinez, Sahar Alrayyes, Christina Nicholas
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Orthodontics, UIC College of Dentistry

Objectives: Food deserts are geographic areas where residents find it difficult or impossible to access nutritious, high-quality food options. The aims of this study were to (1) review literature assessing the relationship between access to healthy food options in the environment and its influence on children's BMI and (2) gain an understanding of the relationship between food insecurity and children's BMI particularly in the Chicago metropolitan area.
Methods: A search was conducted using PubMed and Google Scholars databases Mesh terms "food insecurity", "child obesity", "pediatric" AND "nutrition" AND "body mass index." Our inclusion criteria were: studies conducted in the United States; populations studied were children/adolescents; and a focus on food security and/or environmental access to healthy foods.
Results: Eight articles were included for review based on search criteria. Approximately 15 million children and adolescents in the United States are classified as obese. Research has demonstrated a strong correlation between the food environment—such as access to grocery stores, fast food outlets, and convenience stores—and increased BMI among children. Studies found that limited access to healthy foods is often associated with adverse nutrition-related health outcomes, such as obesity. Research indicates that children living in low-income neighborhoods with constrained access to food typically have higher body mass indexes (85-95%) and suffer from various health complications.
Conclusions: Childhood obesity is a significant epidemic linked in part to poor diet, which is influenced by available food environment. Further research is needed to better understand the implications of food insecurity and not only its link to oral health but also to overall health.
Approval: IRB Protocol Number 2022-13474
Funding: National Institute of Justice NIJ 15PNIJ-22-GG-04433-RESS

137. THE ROLE OF AUTOPHAGY IN MATRIX MINERALIZATION

Ian Christian Gerard Moran, Anne George
Department of Oral Biology, UIC College of Dentistry

Objectives: Autophagy is a cellular process that recycles intracellular macromolecules and degrades toxic cytoplasmic material to provide the cell with nutrients and facilitate cell survival. Mineralization is a cellular process that places calcium phosphate crystals into the extracellular matrix of hard tissue cells. Although autophagy and its role in the differentiation of osteoblasts, osteoclasts, and odontoblasts has been described, the importance of autophagy during matrix mineralization remains unaddressed.

The objective of this review is to characterize the autophagy/matrix mineralization relationship, and, in doing so, elucidate the significance of autophagy during matrix mineralization.
Methods: A NCBI PubMed search was conducted using MESH terms "autophagy", "odontoblast", "osteoblast", "osteoclast", "calcification, physiologic", and "biomineralization".
Results: Autophagy affects matrix mineralization, bone, and teeth. During the mineralization process, autophagy is vital for cell survival and promotes the differential of osteoblast and odontoblasts, the key cells that facilitate bone and dentin formation. Differentiation of these cells results in the synthesis of an organic proteinaceous matrix which subsequently forms the template for deposition of calcium and phosphate to ultimately form crystalline hydroxyapatite. In bone, autophagy influences osteoblastic/osteoclastic activity and bone remodeling. In teeth, autophagy participates in odontogenic differentiation and facilitates odontoblastic secretion of dentin matrix proteins. Moreover, in dental pulp stem cells treated with IL-37, the Beclin1, LC3 I, LC3 II and P62 autophagy markers were observed.
Conclusions: Autophagy is critical to support bone mineralization and tooth formation by supporting intracellular signaling pathways required for cell differentiation and subsequent matrix mineralization.
Approval: N/A
Funding: NIH R01 DE031737, NIH R01 DE028531, The Brodie Endowment Fund

138. HYDROXYAPATITE SYNTHESIS: A LITERATURE REVIEW STUDY TOWARDS BIOMIMETIC METHODS

Mahtab Arbabi, Mareeswari Paramasivan, Mathew T. Mathew
Department of Biomedical Sciences, UIC College of Medicine, Rockford, IL, Department of Restorative Dentistry, UIC College of Dentistry,

Objectives: Bioceramics are an important field of research due to their valuable use for medical applications. The common bioceramics used is hydroxyapatite (HA) because of its high level of biocompatibility due to its similar chemical composition as the mineral part of bone and teeth. It has been widely used in restorative dentistry along with other materials due to its mechanical and osteogenic nature. It is further used as a scaffolding material for bone regeneration. There are currently many methods for synthesizing HA however most methods involve the use of chemical reagents. This review will focus on biological and sustainable hydroxyapatite synthesis methods, which will be further compared with other synthesis techniques.
Methods: In this work, the different methods for synthesizing hydroxyapatite were reviewed. The information was found by analyzing articles on PubMed. These articles were collected using various search terms such as "hydroxyapatite," "HAP," Biomimetic synthesis, and chemical, physical, and sustainable synthesis. They were then grouped, and the most common methods were described. Furthermore, the

benefits and specific uses, as well as drawbacks, of each method were addressed.
Results: It was discovered that there were four major categories for synthesizing hydroxyapatite: physical, chemical, biological, and sustainable methods. This shows a wide range of synthesis techniques that can be used to create HA. However, there is not an equal amount of research being done on all of these methods. Biological and sustainable sources have many benefits for HA production that have been largely ignored by current research. In terms of biological research, different microbes were used to synthesize HA in a similar mechanism through which bone mineral is formed in the human body. There were different techniques that used sustainable sources for the production of HA. Few methods could synthesize HA in a way that is similar to bone mineral in terms of size, morphology, and bioactivity.
Conclusions: Even though there are many methods for synthesizing HA, there are four overarching categories that these methods can fit into. More research is needed on biological synthesis as it involves the biomineralization phenomenon, and it should be further explored to take them to medical applications. Most of the biological methods yield nano-hydroxyapatite, and it has played an important role as it has some exceptional properties regarding high surface energy and solubility. However, more research needs to be done for some of these methods because of the potential for different applications in orthopedics and dentistry.
Approval: N/A
Funding: N/A

139. PANORAMIC RADIOGRAPHIC DIAGNOSIS OF MOLAR-INCISOR HYPOMINERALIZATION (MIH) IN PERMANENT FIRST MOLARS

Ana Aparecida Perucio Camargo Morschel, Kelly Molena, Shlomo Elbahary, Scott Tomar, Richard Monahan, Leda Mugayar
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Pediatric Dentistry, School of Dentistry of Ribeirão Preto, University of São Paulo, Ribeirão Preto, Brazil
Department of Endodontics, UIC College of Dentistry,
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: To review the literature on studies assessing the feasibility of using panoramic
radiographs as a diagnostic tool for dental enamel defects (DED), including amelogenesis imperfecta, hypoplasia, and molar-incisor hypomineralization (MIH) in children, and to identify future research directions in this area.
Methods: An analysis of articles from PubMed, Scielo, and Web of Science databases was conducted using search the terms “Panoramic” OR “Panoramic Radiography” OR “Radiology Panoramic”) AND (“dental defect” OR “enamel defect” OR “molar incisor hypomineralization” OR dental anomalies” OR “MIH.” Inclusion and exclusion criteria were applied.

Results: Panoramic radiography is an effective predictive diagnostic tool for identifying enamel development defects and dental anomalies in children aged 6 to 14. This study reviewed 10 studies that demonstrate the role of panoramic radiography in diagnosing enamel defects. It allows for the observation of structural changes, such as radiolucent lines at the amelodentinal junction of non-erupted first mandibular permanent teeth, facilitating early intervention. Additionally, it proves useful for diagnosing anomalies such as taurodontism and radicular dilaceration.
Conclusions: Panoramic radiographs are practical for diagnosing moderate and severe MIH and identifying related anomalies, making them suitable for initial screenings. However, they have limitations, including difficulty detecting mild cases and inherent distortions. While CBCT might offer advantages in overcoming these distortions, future research should compare panoramic radiographs with other imaging techniques and evaluate their applicability across different populations and defect types. Early diagnosis and communication with parents are crucial for timely intervention.
Approval: N/A
Funding: N/A

140. EMPLOYING BEST SPATIAL ANATOMY TEACHING PRACTICES TO THE PARANASAL SINUSES

Yaret Serrano, Richard Monahan, Steven F. Miller
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: Understanding complex three-dimensional relationships is foundational to student success in dental gross anatomy. Spatial ability has been correlated with success in dental anatomy with studies providing divergent strategies on how to cross the divide in spatial ability amongst anatomy students. This study conducts a literature review focusing on the latest studies in anatomy education research to establish best practices for bridging this gap. These practices are then applied to the development of a new paranasal sinuses teaching resource.
Methods: The literature review was conducted using PubMed. A total of 2,021 studies were returned from the PubMed search using the MeSH term “spatial navigation”. The search was refined to include the MeSH terms “anatomy” and “education, medical” to narrow the number of results to 13 studies. These articles were reviewed for best practices in teaching complex three-dimensional anatomy. Particular attention was given to articles that addressed differences in student spatial ability.
Results: Studies show a weak to moderate relationship between spatial ability and anatomy performance, depending on the assessment type being used. Teaching materials designed to address complex anatomical relationships should include additional strategies to assist learners of varying spatial ability. Strategies from this literature review include: 1) the use of haptic-based techniques, such as drawing or physical models; 2) providing fewer anatomy images from different views to decrease cognitive load; 3) non-additive visual signals (using color coding for structures rather

than lines or arrows); and 4) dynamic visual aides such as videos or animations to augment learning materials.
Conclusions: These best practices from the literature are being incorporated into a new teaching resource that is being developed to address the complex anatomy of the paranasal sinuses. This resource includes physical models, exercises focused on drawing, dynamic visual aids, and measures taken to reduce cognitive load for dental students.
Approval: N/A
Funding: N/A

141. CULTURAL DIFFERENCES IN ACTIVE LEARNING ACCEPTANCE

Nirmeen Tahir, Luma Odeh
Department of Oral Medicine and Diagnostic Sciences, UIC College of Dentistry

Objectives: This review aims to explore how students from different cultural and educational backgrounds and levels of experience perceive and contribute to group sessions and participate in active learning. Understanding these differences can aid in developing improved teaching and learning strategies in dentistry.
Methods: A search of PubMed and Google Scholar databases was conducted using mesh terms ""Cultural Competency/education""[Mesh] AND ""Problem-Based Learning""[Mesh]. Inclusion and exclusion criteria were applied. Ten articles were selected out of 34 for the final detailed review.
Results: Active learning established a connection between basic science and clinical knowledge. Individuals from various cultural backgrounds bring different perspectives and strengths to group sessions, enhancing the overall learning experience and fostering creativity. Some of their strengths include constructivism, a supportive classroom environment, and diverse learning styles. Challenges noted included communication skills; students were more open with peers from their own cultural backgrounds, which led to bias among peers. Some students dominated discussions and intimidated others, while some felt their thoughts were not being heard. Strategies for addressing these cultural barriers include designing lesson plans, incorporating cultural topics into the curriculum, applying Kleinman's and other learning models to prepare students for culturally diverse environments, engaging in cross-cultural experiential learning exercises, and assessing cultural knowledge through pre- and post-surveys.
Conclusions: While addressing the questions of culture and style is not easy, they are essential to contemplate together (Mantiri 2015). Adult learners perceive active learning in diverse ways, as shown by their engagement in self-reflection papers and their willingness to embrace the methodology. Further research is necessary to develop additional resources, materials, and tools that accommodate students from various cultural backgrounds and enhance understanding of cultural differences in embracing active learning methodologies.
Approval: N/A
Funding: N/A

142. NON-INVASIVE ANTI-CARIES APPROACHES IN PERMANENT TEETH

Sydni Thomas, Azza Tagelsir Ahmed, Evelina H. Kratunova, Christine D. Wu, Sahar Alrayyes, Camila Zamperini, Majd Alsaleh
Department of Pediatric Dentistry, UIC College of Dentistry,
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Non-invasive anti-caries strategies offer a promising approach to regenerating enamel in the early stages of caries development. This literature review aims to evaluate and compare the remineralization potential of non-invasive interventions, including P11-4 Peptide, Sodium Fluoride White Varnish, and Silver Diamine Fluoride (SDF), on permanent teeth with incipient caries.
Methods: A systematic literature search was conducted using NCBI, PubMed and Google Scholar with MeSH terms such as "remineralization," "Curodont (self-assembling peptide P11-4)," "fluoride varnish," "Silver Diamine Fluoride," "guided enamel regeneration," "permanent teeth" and "white spot lesions." Inclusion and exclusion criteria were applied, resulting in the selection of 15 relevant articles for analysis.
Results: Among the 15 articles reviewed, 9 were randomized controlled trials and 6 were systematic reviews. Two of the systematic reviews specifically focused on silver diamine fluoride (SDF) and fluoride varnish. These reviews concluded that SDF was more effective than fluoride varnish for treating enamel caries, likely due to its higher fluoride concentration. However, the combination of SDF and fluoride varnish was found to enhance remineralization rates. The remaining four systematic reviews focused on P11-4 Peptide and found improvement in caries arrest and a decrease in lesion size with the use of these treatments. The randomized controlled trials revealed that while fluoride varnish showed moderate efficacy in remineralization, P11-4 Peptide consistently demonstrated superior effectiveness. Furthermore, when compared to other agents such as SDF and casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), P11-4 Peptide exhibited one of the highest remineralization rates.
Conclusions: The reviewed studies consistently have similar results in the efficacy of P11-4 Peptide on caries arrest and remineralization in permanent teeth. These findings suggest that P11-4 Peptide is a highly promising non-invasive intervention for managing early caries in permanent teeth. However, further research is needed to assess its long-term application and effectiveness in clinical practice.
Approval: IRB Approval Number 2024-0741
Funding: UIC Pediatric Dentistry Department

143. EXPLORING FLOSSING BEHAVIORS IN YOUNG CHILDREN

Malik Walters, Brittaney Hill, Bhakti Desai, Lisa Rawle, David Avenetti
Department of Pediatric Dentistry, UIC College of Dentistry

Objectives: Regular flossing is empirically recommended to prevent caries and promote periodontal health. This literature review aims to identify the prevalence and caries-preventive effect of flossing in children, particularly those in the primary dentition. Additionally, it seeks to identify literature that describes the perceived barriers and facilitators to flossing among young children. Understanding flossing behaviors and their caries-preventive effects can assist in developing interventions to promote oral health, especially for high-risk children and families.
Methods: A search using Google Scholar, PubMed, SCOPUS, and EMBASE was conducted using the following MeSH terms: "floss, flossing, OR dental floss" and "primary teeth, primary dentition, OR children." Study inclusion criteria included worldwide articles in English with children as study participants. Twelve articles were selected for final review.
Results: The prevalence of young children who floss regularly or daily was estimated to be approximately 12.6%. While studies emphasize the importance of flossing for oral health promotion, there is limited research showing the caries-preventive effects of flossing in the primary dentition. Common barriers to flossing included lack of motivation/knowledge about the importance of flossing, difficulty with motor coordination, limited parental time and effort, the perception that flossing is uncomfortable for the child, and fearful or resistant child behavior. Common facilitators included parental and child education, modeling and regular flossing by parents, using child-friendly tools, positive reinforcement, and establishing routines for consistency. Some sociodemographic factors associated with flossing in adults include higher socioeconomic status, access to dental care, cultural beliefs, parental marital status, child age, and social support. The role of parents in a child's flossing routine is consistently regarded as highly important.
Conclusions: There is limited data on flossing prevalence and very limited data on the caries-preventive effect in young children. Barriers and facilitators seem well understood. Further research is needed to assess the caries-preventive effects of flossing in young children, particularly in high-risk populations. Future studies should focus on identifying effective interventions to overcome identified barriers and enhance parental involvement in promoting flossing.
Approval: N/A
Funding: N/A

CRITICALLY-APPRAISED TOPICS (CATS)

144. WHAT ARE THE OPTIMAL ANTERIOR VENEER PROVISIONAL TECHNIQUES?

Camila Cardona, Andrea Reale Reyes
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Provisional restorations protect prepared teeth, maintain aesthetics, and ensure patient comfort during veneer treatments. Direct and indirect techniques are widely used, but no consensus exists on the optimal approach. This review compares these methods, focusing on durability, aesthetics, patient comfort, and clinical efficiency to provide evidence-based guidance.
The following PICO question has been developed:
PICO: In patients receiving veneers, how does using direct techniques compared to indirect techniques for creating provisional restorations impact its optimization?
P: Patients receiving veneers
I: Direct techniques/chairside for creating provisional veneers
C: Indirect techniques/digital for creating provisional veneers
O: Optimal outcomes in terms of durability, aesthetics, tissue contouring, patient comfort, and ease of application/removal
Methods: A search of PubMed, Cochrane Library, and Google Scholar identified peer-reviewed studies from the last decade. Inclusion criteria emphasized high-quality in vitro, in vivo, and clinical studies. Outdated or irrelevant research was excluded to ensure relevant evidence.
Results: Identified Articles and their Clinical Appraisal
Esquivel J, Villarroel M, Tran D, Kee E, Bruggers K. The utilization of snap-on provisionals for dental veneers: From an analog to a digital approach. J Esthet Restor Dent. 2020 Mar;32(2):161-170.
Case Series that evaluates adhesive strategies in an in vitro setting, providing quantitative insights into SbS and enamel roughness. Spot-etch techniques and advanced adhesives improve provisional veneer outcomes by enhancing micromechanical retention and adhesion. Universal adhesives and flowable composites achieve high shear bond strength (SbS) but may complicate removal if too strong.
Studzinski Dos Santos C, de Souza GFB, Morel Lourenço L, Boscato N, Ratto de Moraes R, da Silveira Lima G. Spot-etch technique and other adhesive strategies for provisional veneers. Int J Esthet Dent. 2024 Aug 2;19(3):282-293.
In vitro study evaluating clinical technique for snap-on provisionals, offering practical guidance but lacking experimental validation or specific patient outcomes. CAD-CAM technology and snap-on provisionals enhance precision, efficiency, and hygiene. Digital workflows excel in additive cases but may need adjustments for subtractive scenarios. Direct techniques provide chairside convenience, while indirect techniques offer superior aesthetics and precision, particularly in complex cases.
Conclusions: This comparison highlights evidence-based strategies to optimize

provisional restorations. By integrating adhesive methods with fabrication techniques, clinicians can improve durability, aesthetics, and patient comfort, enhancing overall treatment outcomes and satisfaction in veneer cases.
Approval: N/A
Funding: N/A

145. ARE ONLAYS ACCEPTABLE TO RESTORE ENDODONTICALLY TREATED TEETH?

Adriana Fernanda Mendez-Francia, Camila Zamperini, Andrea Reale Reyes, Alexandra Rodriguez
Department of Restorative Dentistry, UIC College of Dentistry

Objectives: Clinical Question: What are the indications for partial coverage restorations (onlays) compared to full coverage crowns in endodontically treated teeth (ETT)?
PICO question: For patients with ETT (P), how do partial coverage restorations such as onlays (I) compared to full coverage restorations or direct restorations (C) perform in terms of success and survival rates. (O)?
P: Patients with ETT
I : Partial coverage restorations (onlays)
C: Full coverage crowns or direct restorations
O: Success and/or survival rate
Methods: Search strategy:
Database searched: PubMed (12/12/2024)
Keywords: “root canal-treated teeth,” “endodontically treated teeth,” “partial coverage restorations,” “indirect bonded restorations,” “onlays,” “full crowns,” “clinical outcome”
Boolean Combinations: ""Endodontically treated teeth"" AND ""indirect bonded restorations"", “Root canal-treated teeth” AND “onlays
Results: Articles and Critical Appraisal
Alhamdan et al. Cureus 16(9): e70116.
This article assessed the clinical outcomes of partial coverage bonded porcelain restorations and full-coverage crowns for ETT, reporting similar survival rates of over 95%.
Dioguardi et al. Dental materials, 38 (2022), e203–e219.
This article reviewed the failure rates of indirect bonded restorations in ETT, reporting an 8.7% failure rate over 2–4 years, which increased to 20.94% after 12–30 years. Importantly, most failures were due to restoration issues, were largely reversible and repairable.
Dias et al. Journal of Prosthodontics 27 (2018) 598–604.
This prospective study showed 96% success rate and 100% survival rate of 150

indirect composite partial coverage restorations over a 2–5-year period.
Clinical application: Partial-coverage restorations, such as onlays, offer a less invasive solution for restoring endodontically treated teeth. They effectively preserve natural tooth structure, maintaining the enamel and overall biomechanical integrity while achieving survival rates comparable to full crowns. Clinical success depends on multiple factors including cavity size, residual tooth structure, occlusal forces, and material properties. By maintaining tooth structure, the likelihood of irreversible damage and tooth loss is reduced. While current evidence highlights their practical use and success in clinical settings, further research is needed to establish specific indications, refine preparation techniques, optimize material selection, and validate long-term outcomes.
Conclusions: In the past, it was widely believed that ETT required procedures such as a post and full-coverage crown for long-term success. However, the literature shows partial-coverage restorations, like onlays, as a more conservative and effective option. Onlays preserve more natural tooth structure, reducing volumetric loss and maintaining the tooth's natural integrity. These principles align with minimally invasive dentistry.
Approval: N/A
Funding: N/A

Author Index

Numbers after names refer to abstract numbers, not page numbers.

Author Index

Author Index