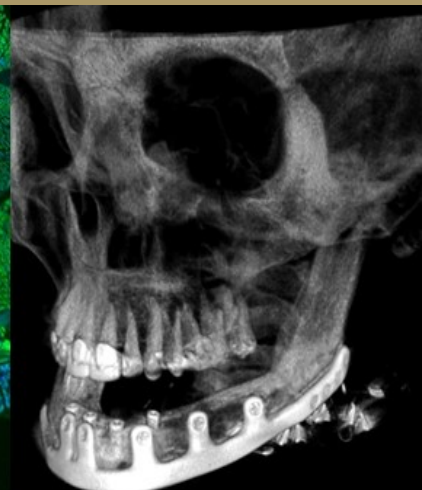
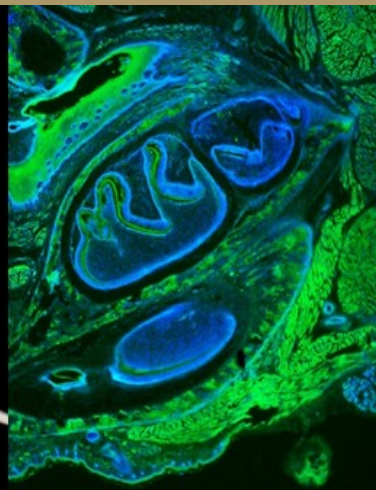
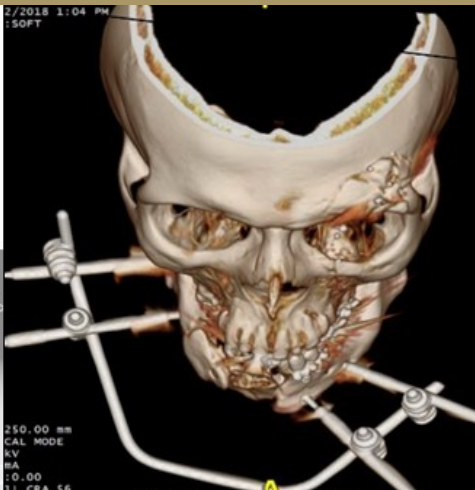
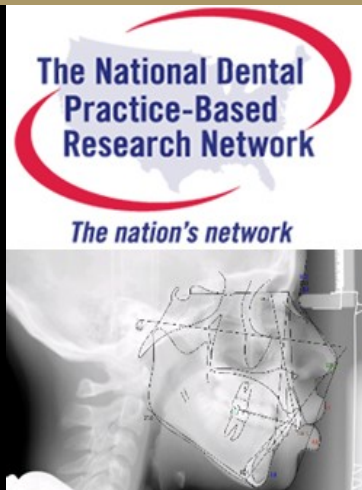


Craniofacial Development & Dental Genetics

March 4, 2020

Mission: to optimize oral health locally and globally



15th Annual Scholars Symposium

Wednesday, March 4, 2020

Schedule of Events



WEST PAVILION ATRIUM

11:30am	<i>Registration – Dental Students/Residents/Post-Graduates/Faculty</i>
11:30am-12:30pm	<i>Lunch</i>
Noon-2:00pm	RESEARCH COMPETITIONS Students & Post-Graduates Poster Presentations and Scholarly Activity
2:00-2:15pm	<i>Poster Removal</i>

MARGARET CAMERON SPAIN AUDITORIUM

2:00-2:15pm	<i>Sign-in Dental Students/Residents/Post-Graduates/Faculty</i>
2:15-2:25pm	WELCOME Michelle Robinson, DMD, MA, Senior Associate Dean <i>UAB School of Dentistry</i>
2:30-3:30pm	KEYNOTE ADDRESS “Finding Needles in Scientific Haystacks” Russell S. Taichman, DMD, DMSc, Dean, UAB School of Dentistry
3:35-4:15pm	FACULTY PRESENTATION “Bench, Boundaries & Benefits: Translating Science to Patients” Chung H. Kau, BDS, MScD, MBA, PhD, MOrthEdin, FDSGlas, FAMS (Ortho), FFDIre, FDSEdin, FACD, FICHEIID, ABO, Cert (Ortho) Professor and Chair, Department of Orthodontics <i>UAB School of Dentistry</i>
4:20-4:45pm	PRESENTATION OF AWARDS & PHOTOS Bhakti Desai, Tanner C. Godfrey, Lauren Katherine Miele, Sarah Gwin Moore, Crystal Michelle Smith, Karter M. Smith
4:50-5:00pm	CLOSING REMARKS Russell S. Taichman, DMD, DMSc, Dean, UAB School of Dentistry



Acknowledgements

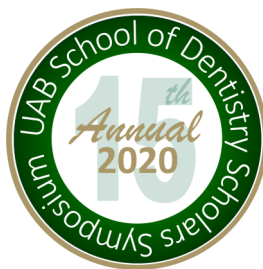
We deeply appreciate the contributions of so many, including the generous financial support of the Hinman Dental Society, Dentsply International, the American and International Colleges of Dentists, Omicron Kappa Upsilon National Dental Honor Society, and the University of Alabama at Birmingham School of Dentistry Alumni Association.

A special thanks to Dr. Robert Taylor for the Robert E. and Ann S. Taylor Endowed Lectureship in Oral Biology.

Also, thanks to the following UAB University-Wide Interdisciplinary Research Centers (UWIRC): Global Center for Craniofacial and Oral Dental Disorders (GC-CODED), Comprehensive Arthritis, Musculoskeletal, Bone, and Autoimmunity Center (CAMBAC), and the Microbiome Center.

We are grateful for the support of the Alabama Chapter of the American Association for Dental Research (AADR) and the UAB Chapter of the AADR National Student Research Group.

We extend kind thanks to the SOD Research Advisory Committee, speakers, judges, and many dedicated volunteers for making our fifteenth Scholars Symposium a success.



Greetings from the Dean

Russell S. Taichman, DMD, DMSc



Greetings,

I am delighted to welcome you to our fifteenth Scholars Symposium. The event highlights one of our school's foundational pillars, *Research*. It provides an annual venue for our faculty, residents, students, staff, and guests to discuss a broad range of topics associated with the methods and outcomes of oral health, dental, and craniofacial research. It also fosters interactions between the School of Dentistry and other schools across campus, as well as UAB's interdisciplinary centers.

Within our research pillar are five clusters of scientific expertise. Among these, craniofacial development and dental genetics is the emphasis of this year's symposium. This theme brings together basic scientists, geneticists, epidemiologists, and molecular and developmental biologists. It seeks to

understand underlying causes of normal and abnormal skeletal and craniofacial development to devise inter- and multi-disciplinary strategies for diagnosis, treatment, and development of novel therapeutics for craniofacial and dental disorders.

In keeping with this year's emphasis, it is a special honor to welcome Ophir Klein, MD, PhD, as our keynote speaker. Dr. Klein is a developmental biologist, pediatrician, and clinical geneticist who is interested in translating an understanding of developmental mechanisms into advances for regenerative medicine. As a physician scientist, he treats patients with birth defects with a long-term goal of utilizing fundamental principles for therapeutic applications. A central focus of his lab is craniofacial and dental development, as malformations in these organs are among the most common congenital abnormalities and have profound impacts on the lives of patients and their families.

Dr. Klein's keynote address is made possible through the generosity of Dr. Robert Taylor. Dr. Taylor established the Robert E. and Ann S. Taylor Endowed Lectureship in Oral Biology and his wonderful gift supports our keynote speaker each year.

Following the keynote, Dr. Chung Kau, professor and chair of our orthodontics department, will present this year's faculty lecture on translating science to patients.

As we observe our fifteenth scholars event, we celebrate the achievements of our students, residents, staff, and faculty as we impact oral health locally and globally. We are proud of our presenters whose dedication to scholarship is on display today. Their excellence is recognized throughout the nation and around the world.

In addition, we deeply appreciate the contributions of so many to the symposium, highlighted by the generous financial support of our sponsors. We also extend kind thanks to the school's Research Advisory Committee, this year's judges, and our many dedicated staff volunteers for making Scholars Symposium a success.

Thanks to all,

A handwritten signature in black ink, appearing to read "R. Taichman". The signature is fluid and cursive, written over a white background.

Russell S. Taichman, DMD, DMSc
Dean



Our Research Themes

Craniofacial Development and Genetics

The emphasis of Scholars Symposium 2020, the Craniofacial Development and Genetics theme brings together basic scientists, geneticists, epidemiologists, molecular and developmental biologists to understand underlying causes of normal and abnormal skeletal and craniofacial development to ultimately devise inter- and multi-disciplinary strategies for diagnosis, treatment, and development of novel therapeutics for craniofacial and dental disorders.

Biomaterial Science and Biomimetic

Research in this thematic area combines materials engineering, stem cell/ developmental biology, regenerative medicine, and tissue engineering to generate novel implants, and medical devices for dental applications. The BioHorizons research clinic consist of eight dental operatories and surgical suite with state of the art imaging capacity for evaluation and clinical trials of new materials.

Oral Microbiology, Infection, and Host Response

Includes study of oral infectious diseases, microbiome, inflammation, immunosenescence, and connection between oral and overall health. The intent of the Dental Microbiome program is to study the impact of oral microbiome on disease outcomes in the oral cavity and in other parts of the body including cardiovascular, osteoarthritis, and diabetes.





Oral Cancer and Bone Marrow Microenvironment

According to the CDC, more than 30,000 new cases of cancer of the oral cavity and pharynx are diagnosed each year and more than 8,000 deaths are caused by oral cancer. This multi-disciplinary group studies the cellular basis of oral, head and neck cancers to identify new prevention and treatment strategies. Current research focuses on the development of small molecule therapies for the odontogenic tumors, and squamous cell carcinoma. Research in this theme is also focused on identifying the molecular mechanisms that regulate how bone marrow functions in both bone health and disease, especially how bone marrow microenvironment regulate dissemination and homing of cancer stem cells.

Clinical Outcomes and Implementation Science

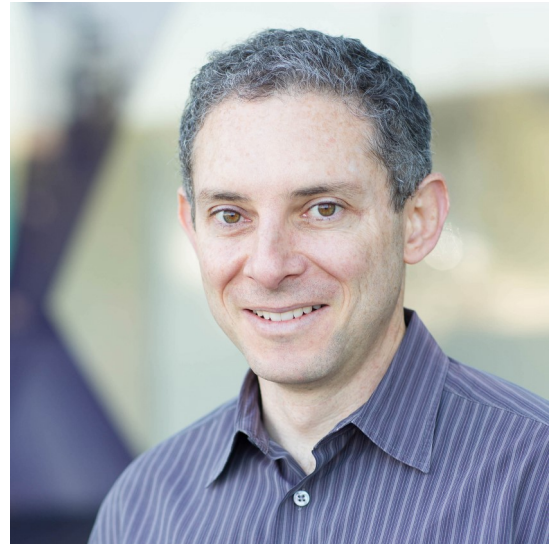
Theme focuses on National Dental Practice-Based Research Network activities, which include clinical effectiveness, clinical trials, and public health issues. A unique union of practicing dentists and academic scientists work together to improve the nation's oral health by building the knowledge base for clinical decision-making and moving the latest evidence into routine care. Practicing dentists suggest problems and provide data and observations; UAB researchers investigate solutions and communicate these back to the practitioners.



Keynote Address

Ophir Klein, MD, PhD

Larry L. Hillblom Distinguished Professor in Craniofacial Anomalies
Charles J. Epstein Professor of Human Genetics
Professor of Orofacial Sciences and Pediatrics
Chief, Division of Genetics
Chair, Division of Craniofacial Anomalies
Medical Director, Craniofacial Center
Director, Program in Craniofacial Biology
University of California, San Francisco



Dr. Ophir Klein is Professor of Orofacial Sciences and Pediatrics, the Larry L. Hillblom Distinguished Professor in Craniofacial Anomalies, and the Charles J. Epstein Professor of Human Genetics at the University of California, San Francisco (UCSF). He serves as Chief of the Division of Medical Genetics, Chair of the Division of Craniofacial Anomalies, Medical Director of the Craniofacial Center, and Director of the Program in Craniofacial Biology.

Dr. Klein earned a BA from the University of California, Berkeley and PhD and MD degrees from Yale University School of Medicine. He completed a Pediatrics residency at Yale University and a Genetics residency at the UCSF School of Medicine. He is an elected member of the National Academy of Medicine and has received the IADR Craniofacial Biology Distinguished Scientist Award and the NIDCR Inaugural Sustaining Outstanding Achievement in Research (SOAR) Award, among other distinctions.

Dr. Klein's research interests include medical genetics, developmental biology, stem cell biology, craniofacial biology, and intestinal stem cells. The Klein Laboratory at UCSF focuses on understanding how organs form in developing embryos and how they regenerate in adults. When developmental and regenerative processes go awry, then birth defects, cancer and other diseases can result. The group's research is centered on understanding how development and regeneration normally occur in the hope of one day treating diseases that result from abnormalities in these processes.

Craniofacial and dental development is a central focus in Klein's lab, as malformations in these organs are among the most common congenital abnormalities and have profound impacts on the lives of patients and their families. The maintenance, repair and growth of many adult organs, such as the bone marrow, skin, brain, and gastrointestinal tract, depend on tissue-specific populations of stem cells. Klein's lab uses the rodent incisor, which grows continuously throughout the life of the animal, as a model system to understand adult stem cells. We intend to use the insights provided by our experiments in mice to guide us in the use of stem cells in regenerating dental and craniofacial tissues as a paradigm for developing replacement organs.



Faculty Presentation



Chung H. Kau, BDS, MScD, MBA, PhD

MOrthEdin, FDS Glas, FAMS (Ortho), FFD Ire, FDS Edin, FACD, FICHEIID, ABO, Cert (Ortho)

**Professor and Chair, Department of Orthodontics
*University of Alabama at Birmingham***

Dr. Kau is a Professor of Orthodontics and Chairman of the Department of Orthodontics at the University of Alabama at Birmingham, School of Dentistry. He is a Diplomate of the American Board of Orthodontics and completed Specialist Registration with the General Dental Council, United Kingdom. He serves as the Director of

the Craniofacial Orthodontia Clinic in partnership with the Children's Rehabilitation Service and Medicaid of Alabama. He has been awarded visiting Professorships at the University of Debrecen and the University of Szeged, Hungary and Nanjing Medical University, China.

Chung H. Kau obtained Bachelor of Dental Surgery (BDS) from the National University of Singapore, Masters Science Dentistry (MScD) from the University of Wales, College of Medicine and received a Ph.D. from Wales College of Medicine, Cardiff University, United Kingdom. He completed Orthodontics Certificate at UAB. Dr. Kau has received several honors, including the Dean's Excellence in Teaching Award, School of Dentistry, University of Texas Health Science Center, Houston, Executive Leadership Fellowships from ADEA and the King James IV Professor by the Royal College of Surgeons, United Kingdom. He has mentored 60 students for their Master's thesis, 12 Post-docs and fellows and a Fulbright Scholar. He has served frequently as an expert witness on Patent Re-examinations and patent disputes and currently chairs the IADR-AADR William Gies Award Committee.

Dr. Kau enjoys practicing clinical orthodontics with a special interest in Craniofacial Anomalies and Dento-facial Deformities. His clinical translational research focuses on clinical efficiency, accelerated tooth movement, and 4D jaw tracking. His research work and clinical trial on facial growth and 3D imaging in Orthodontics have been funded by a number of NIH and Industry grants. Dr. Kau is prolific contributor to the orthodontic literature with over 136 peer-reviewed publications, 3 books, 88 conference papers and over 160 invited and keynote lectures.





We appreciate the contributions of our expert faculty judges

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We thank our dedicated
volunteers for giving their time
and talents

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Basic Science / Pre-Doctoral

101 - Edwin Rojas

A Novel Inhibitor of *S. mutans* Diadenylate Cyclase for Preventing Dental Caries

E. Rojas, X. Peng, H. Zhang, R. Wu, S. Velu, H. Wu

Objective: To discover therapeutic agents of dental caries specifically targeting the diadenylate cyclase of *Streptococcus mutans*.

Methods: With the co-crystal structure of the cyclase with AMP, high throughput *in silico* screening was conducted to obtain lead compound PB8, which was synthesized along with other analogs and tested *in vitro* against the survival and biofilm formation of *S. mutans* WT UA159 and other commensal species. PB8 was also examined *in situ* in an optimized fluorescence turn-on assay for inhibition of enzymatic activity of the cyclase.

Results: PB8 has an IC₅₀ of 9.61 ± 1.02 μM against biofilm formation of *S. mutans* UA159 and does not affect the survival of *S. mutans* and other commensal bacteria up to 100 μM. PB8 analogs with a -H, -Cl, -OMe, -COOMe, and -amine/TFA salt at the para position of the diphenyl ether moiety have similar activity, however modifications to the carboxyl group of PB8 (-OBn or -OMe) enhanced biofilm formation. The fluorescence turn-on assay shows that PB8 inhibits the cyclase based on the decrease in c-di-AMP production. Interestingly, upon optimization of the enzymatic assay, the cyclase was active in the presence of Mn²⁺, not Mg²⁺.

Conclusions: A more water-soluble and active analog of PB8 is needed to enable co-crystallization with the cyclase. The pyruvate group in PB8 is essential for binding, and changes to the para-functional group of the diphenyl ether moiety in PB8 may affect the solubility which can subsequently impact biofilm formation. The fluorescence turn-on assay can monitor c-di-AMP production, yet more information on the amount of c-di-AMP obtained from dose-dependence studies is needed from LC-MS/MS or phospho imaging. The cyclase activity in the presence of Mn²⁺ matches the characteristic of the CdaA family of DACs.

102 - Tanner Godfrey

BAF45A Mediated Chromatin Landscaping Controls Bone Formation

T. Godfrey, B. Wildman, M. Rehan, T. Busby, Y. Chen, Q. Hassan

Objective: A key process during cellular differentiation is the creation of unique landscapes of accessible DNA, thus driving specialized patterns of gene expression required for the development of a given cell. The BAF chromatin remodeling complex creates cell-type specific landscapes of accessible DNA based upon the subunit composition of that complex. Here, we have identified Baf45a to be a key subunit of the male osteogenic BAF complex required during bone formation.

Method: Osteogenic responsive BAF subunits were investigated using gene expression and chromatin binding analysis under osteogenic conditions. To investigate the in-vivo role of Baf45a in osteoblasts at boneformation (2-months), osteoblast specific deletion (Osteocalcin Cre) of Baf45a was performed and analyzed by micro-CT, histomorphometry, 3-point-bend test and gene expression analysis. Molecular analysis included ATAC and RNA sequencing of primary cells with Baf45a deletion. Finally, the osteogenic BAF complex composition was investigated using epigenetic analysis via ChIP sequencing and targeted proteomics.

Results: Of 21 BAF subunits Baf45a was most responsive to osteogenic cues with increased expression with BMP2 treatment and osteoblast differentiation. Deletion of Baf45a results in significantly decreased trabecular and cortical bone during bone formation in males. This translated to significantly weaker bones. Histological analysis revealed decreased osteoblast numbers and decreased mineralized surface. Analysis of humorous RNA showed an altered pattern of osteoblastic gene expression. Next, primary cells were analyzed via ATAC and RNA sequencing to reveal significantly altered landscapes of accessible DNA with negatively impacted patterns of osteoblastic gene expression with loss of Baf45a. Epigenomic and proteomic analysis yielded a candidate composition of the osteoblast-specific BAF complex.

Conclusions: These findings illustrate that Baf45a is a critical member of the osteogenic BAF complex with loss of Baf45a resulting in decreased levels and strength of bone in males. These findings will have important implications in understanding osteoblast activity during health and disease.

103 - Joshua Miehler

Characterization of the Adherence of AgI/II-Family Proteins to Fibrinogen

J. Miehler, N. Schormann, M. Patel, S. Purushotham, H. Wu, C. Deivanayagam

Objective: Oral streptococci are known to cause infections beyond the oral cavity. To do so bacteria must first invade the blood stream so it may transiently locate a foothold. Two common oral pathogens known to cause extra-oral infections are *Streptococcus intermedius* and *Streptococcus mutans*. Like other streptococcal species they both display the AgI/II family surface proteins for their interactions with the host and other microorganisms. These proteins are now being increasingly implicated in streptococcal adherence to a variety of host proteins. This study aims to identify AgI/II family protein constructs that adhere to fibrinogen and characterize this interaction.

Method: The Pas domains, VPas and C123Pas, and the AgI/II domains, VPas and C123Pas, were purified using affinity and ion exchange. Surface Plasmon resonance was used to quantify the affinity of the interaction between Pas domains and AgI/II domains and immobilized fibrinogen.

Results: Our surface plasmon resonance studies with *S. intermedius* Pas V-region (VPas) and C-region (C123Pas) show interactions with fibrinogen. Similar studies with *S. mutans* AgI/II V-region (VAgI/II) and C-region (C123AgI/II) also show interactions with C123AgI/II and VAgI/II.

Conclusions: The observed differential adherence to the blood protein fibrinogen presents an opportunity to investigate the hematic transmission of streptococcal species, given their roles in bacterially induced endocarditis.

104 - Benjamin Wildman

EZH2 is Regulated by the miR-23a Cluster to Maintain Bone Mass In Vivo

B. Wildman, T. Godfrey, M. Rehan, Y. Chen, T. Busby, Q. Hassan

Objective: Differentiation of pre-osteoblasts is critical to controlling in-vivo development and growth of bone. Recent studies highlight the importance of epigenetic regulation in directing osteoblast commitment and function. Here we show that the microRNA-23a cluster (miR-23a, 27a, and 24-2) controls bone mass in-vivo through a previously unknown epigenetic mechanism.

Method: First, we knocked down the miR-23a cluster in mouse pre-osteoblasts (MC3T3-E1) cells with an anti-microRNA cassette (miRZIP). Next, we created a mouse model that inducibly expresses the miRZIP cassette to knock-down the microRNA cluster (miR-23aCIZIP) in committed osteoblasts. Luciferase and Chromatin Immunoprecipitation (ChIP) assays along with RNA sequencing were performed to elucidate the mechanism of miR-23a cluster action in maturing osteoblasts.

Results: MiR-23a cluster knockdown increased the intensity of Alkaline Phosphatase staining in MC3T3-E1 cells. Additionally, it upregulated mRNA expression of osteogenic marker genes such as Runx2 and Osteocalcin. Micro-CT analysis of 2 month old femurs showed that trabecular bone volume and trabecular number significantly increased in miR-23aCIZIP mice as compared to controls. Additionally, connective density and trabecular thickness were significantly greater while trabecular space was significantly decreased. Supporting this increased bone mass, Runx2 expression levels were significantly upregulated while the levels of a potent epigenetic repressor Ezh2 were significantly reduced in whole bone RNA sequenced from miR-23aCIZIP mice.

Mechanistically, we found that the miR-23a cluster inhibits RUNX2 translation by binding to the 3' UTR of Runx2 mRNA transcripts. Furthermore, ChIP assays revealed RUNX2 binds to the Ezh2 promoter inhibiting transcription in MC3T3-E1 cells. Additional ChIP experiments in miR-23aCIZIP mouse primary calvarial pre-osteoblasts showed that miR-23a cluster knockdown results in decreased binding of the epigenetic repressor EZH2 to osteogenic gene promoters such as Osteocalcin and Runx2, resulting in a more osteogenic transcription program.

Conclusions: We developed a novel microRNA cluster knockdown mouse model allowing us to decipher how the miR-23a cluster orchestrates bone mass maintenance in-vivo.

105 - Theodore Busby

Molecular Mechanism Of BAF45A Chromatin Regulation In Odontoblasts.

T. Busby, T. Godfrey, M. Rehan, B. Wildman, Q. Hassan

Objective: Tissue specific epigenetic regulation and the resulting gene expression patterns contribute to cellular identity and function. Remodeling of chromatin by the BAF complex contributes to gene activation by sliding nucleosomes into an open conformation around active loci. Cell specific BAF activity arises from the modular composition of subunits. However, little is known about BAF complex mediated gene expression in dental pulp cells. Our lab has identified BAF45A as an essential BAF subunit for differentiation in osteoblasts. The objective of this study is to characterize the molecular function of BAF45A and its homologs BAF45B/C/D during differentiation of odontoblasts.

Method: To characterize BAF45A mediated BAF activity in odontoblast, we subjected OD-21 pre-odontoblast cells to differentiation conditions. We analyzed the changes in expression of Baf45 homologs and odontoblast specific genes in undifferentiated and differentiated cells. We also performed ChIP-QPCR and ATAC-seq to assess the changes in BAF complex occupancy and chromatin accessibility at these tissue specific loci.

Results: Here we show that BAF45A and BAF45D are preferentially expressed in odontoblasts compared to BAF45B and BAF45C. BAF45A is part of the Polybromo-BAF (PBAF) complex. Here we show that loss of BAF45A causes a reduction in chromatin accessibility at genes important for mineralization and differentiation. We also assess histone acetylation chromatin occupancy around these genes.

Conclusions: BAF45A is an important BAF complex member for the development of mineralized tissue, in both bone and tooth. BAF45A, in addition to BAF45D, are the primary homologs expressed in these tissues and it appears at this time that the expression of BAF45B and BAF45C are negligible for differentiation and development.

106 - Victoria Matkins

Perturbations of Mesenchymal Stromal Cells During Inflammation

V. Matkins, S. Patel, V. Camacho, A. Hoang, R. Welner

Objective: The bone marrow microenvironment (BMM) is a complex network of blood and non-hematopoietic cells. These cells form the stem cell niche to aid in regulation of hematopoietic stem cell self-renewal and differentiation. Within the non-hematopoietic compartment, subpopulations of mesenchymal stromal cells (MSCs) give rise to osteoblasts and adipocytes. These cells communicate with the hematopoietic system through adhesion molecules and cytokines to maintain homeostasis. Inflammation's disruptive impact on the hematopoietic system has been greatly studied; but how inflammation impacts the BMM is poorly understood. During inflammatory conditions bone loss has been noted; therefore, we hypothesize an increase in the MSC population to compensate for the defect in bone differentiation.

Method: To induce inflammation we will use highly characterized models for the blood system of TLR3/4 stimulation with Poly(I:C) and LPS, respectively. First, we will phenotypically characterize the stroma using flow cytometry of lineage tracing. The lineage-specific Cre models mark stroma (Prrx1), adipocytes (AdipoQ), and late stage osteoblasts (OCN). Second, we will functionally test the stromal cells ability to self-renewal and differentiate. Finally, we will profile the cytokines and altered signaling pathways to understand where inflammation is dysregulating the stroma.

Results: Phenotypically there is overall reduction in the fate mapped stroma cells as shown by the lineage tracing models, however, there was an increase in the number of MSCs present. This increased MSCs represented an increased progenitor potential along with an increased potential to differentiate into adipocytes and osteoblasts. From cytokine array and RPPA there is upregulation of inflammatory cytokines and pathways that account for this functional difference.

Conclusions: Understanding changes in the BMM during inflammation will allow for therapeutic intervention in inflammatory diseases such as arthritis, osteomyelitis, and leukemia.

107 - Farah Jiwani

Runx2 Mediated Osteoblasts Signaling Affects Immune Cells

F. Jiwani, M. Khass, K. King, H. Rashid, A. Javed

Objective: To understand how mature osteoblasts regulate the development and maturation of immune cells.

Method: Development and distribution of immune cells in the peritoneal cavity, bone marrow, and spleen compartments of the wild type and Runx2 mutant mice were compared by FACS analysis.

Results: The Runx2 gene was deleted in immature osteoblasts (Collagen-1 driven Cre) and in mature osteoblasts (Osteocalcin driven Cre) by Cre-recombinase. We find that the deletion of Runx2 in osteoblasts

does not affect embryonic bone development in mice. However, post-natal bone development is severely disrupted. The OC-Cre/Runx2 homozygous mutants showed rapid onset of osteoporosis, exhibited sign of premature aging, and died at 5 months of age. Interestingly, these mice showed enhanced fat deposition in the bone marrow suggesting impaired bone marrow microenvironment. We assessed if certain subsets of the B cell lineages are affected upon Runx2 deletion in osteoblasts. Bone marrow, spleen, and peritoneal cavity cells were harvested from 3 month old wild type and homozygous female littermates. Subset of B cells at various stages of maturation were analyzed and sorted based on surface marker expression using FACS. Interestingly, in mutant mice, total number of B cells were decreased by 20-60% when compared to its wild type littermate. The decrease in B cell was noted in specific subsets in the bone marrow (early B cells), spleen (transitional and follicular B cells), and peritoneal cavity (B1 population). Studies to further characterize changes in B cell development by stage-specific genes at mRNA and protein levels are currently underway.

Conclusions: Runx2 deficiency in osteoblasts is associated with alteration in development and maturation of B cells.

108 - Rhea Derke

The Reactive Chlorine Response Protein RclA Reduces Copper (II) and is Needed for Effective Host Colonization in *E. coli*.

R. Derke, A. Barron, N. Broderick, M. Gray

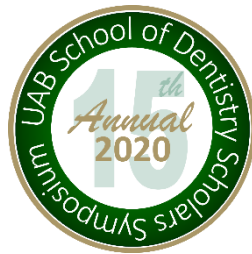
Objective: Commensal bacteria must resist oxidative stress to survive within their hosts, especially in the context of chronic inflammatory diseases. The bacterial responses to hypochlorous acid (HOCl), a potent oxidant produced by neutrophils, are complex, incompletely characterized, and distinct from the well-studied responses to reactive oxygen species. This project identifies the function of a protein called RclA, which has been shown to be highly upregulated in HOCl-stressed *E. coli*, protective against HOCl stress through an unknown mechanism, and conserved among many species of bacteria found on epithelial surfaces.

Method: RclA activity in the presence of metals was determined by measuring NADH consumption over time. HOCl sensitivity of *E. coli* with and without copper was assayed using growth curves. Host colonization efficiency in *Drosophila melanogaster* was determined via CFU counts after 3, 12, and 24 hours post infection.

Results: Because RclA shares sequence homology and a highly-conserved cysteine motif with disulfide reductases, including mercuric reductase, we hypothesized that its function is to reduce an HOCl-oxidized cellular component. We tested RclA activity against a panel of biologically relevant metals and found that specific activity of RclA was greatly increased in the presence of Cu(II). Furthermore, we were able to measure Cu(I) accumulation at the end of the RclA/Cu(II) reaction using a Cu(I) specific chelator. These results show that the substrate of RclA is Cu(II), which it reduces to Cu(I). It has been shown previously that *E. coli* mutants lacking *rclA* are more sensitive to HOCl stress but how the combination of HOCl and copper affects survivability had not been studied. To address this, we determined the lag phase extension of wild-type and $\Delta rclA$ *E. coli* in the presence of HOCl after being grown up overnight in minimal media with and without copper. We found that the *rclA* mutant was more sensitive to HOCl stress than wild-type when both strains were grown up with copper. Interestingly, there was no difference in HOCl sensitivity between the strains after they were grown up in media lacking copper. This suggests that the function of RclA is to prevent the combinatorial stress of copper and HOCl. Finally, we show that a *rclA* null mutant of *E. coli* Nissle

1917 is defective in colonizing *Drosophila melanogaster* and that reducing the amount of host-produced HOCl, using a Duox knockdown, ameliorates the colonization defect of the mutant during early colonization.

Conclusions: Together, our results illustrate the importance of RclA's copper reductase activity in resisting oxidative stress while colonizing a host.



109 - Hamilton Behlen

Is the Use of Counterclockwise Rotation of the Maxillomandibular Complex a Stable Treatment Option for Patients With Juvenile Idiopathic Arthritis?

H. Behlen, B. Kinard, P. Waite

Objective: The purpose of this study is to evaluate the long-term skeletal stability (> 6 months) of orthognathic correction of dentofacial deformities secondary to JIA in individuals without total alloplastic joint reconstructions.

Method: The retrospective case series includes a study sample that was derived from a population of patients diagnosed with JIA who underwent orthognathic surgery that, at a minimum, included a Le Fort I maxillary osteotomy and bilateral sagittal ramus osteotomies with CCW rotation of the MMC. All subjects had lateral cephalometric radiographs prior to surgery, within one month after surgery, and at a minimum, 6 months after the date of surgery. To evaluate the long term skeletal changes, the occlusal plane angle (OP), mandibular plane angle (MP), anterior facial height, and posterior facial height measurements were constructed.

Results: The mean long-term postoperative changes in the maxillary occlusal plan, anterior facial height and posterior facial height met the study's definition of stability. No consistent trend of long-term post-surgical change was identified.

Conclusions: Surgical orthognathic correction offers patients with JIA the opportunity to improve their head and neck function and thus, quality of life. With such a small sample size, the findings of this study convey the need for more research to be done to determine the long-term stability of the surgical counterclockwise rotation of the MMC.

110 - Valerie Reyes and Fiorella Valdespino

Wear, Strength, and Translucency of CAD/CAM Zirconia With Accelerated Sintering

V. Reyes, F. Valdespino, C. Fu, A. Maharishi, J. Burgess, N. Lawson

Objective: Zirconia blocks have been developed for chairside CAD/CAM fabrication that may be sintered in less than 30 minutes. The aim of this study was to compare the relevant properties of these zirconia materials to lithium disilicate.

Method: Samples were prepared of 3 zirconia materials used for chairside CAD/CAM fabrication (3M Chairside Zirconia, Sirona Cerec Zirconia, Kuraray Katana STML) and lithium disilicate (Ivoclar e.max CAD LT), all shade A3. All zirconia specimens were fast sintered according to manufacturer IFU in a SpeedFire furnace. All specimens were polished to P2500 SiC paper. Wear of opposing enamel (n=8) was measured in the UAB wear testing device with standardized, conical, human molar antagonists. The wear test was performed with 20N/300,000cycles/33% glycerine lubricant. Volumetric enamel wear was measured with a non-contact profilometer. Three-point bend flexural strength specimens (16mmx4mmx1.2mm, n=10) were prepared and loaded to failure at 1mm/min. Translucency specimens were prepared (8.5mmx8.5mmx1mm, n=3). L*a*b* values were taken against white and black backgrounds with a Color-i7 spectrophotometer and deltaE was calculated to determine translucency parameter. Data were analyzed with ANOVA and Tukey post-hoc analyses.

Results: Results are presented in table (mean+/-SD). There were significant differences between materials for all properties ($p<.01$). Materials in each column with different superscripts are statistically different.

Conclusions: All fast sintered zirconias demonstrated less opposing enamel wear, higher strength, and less translucency than lithium disilicate. 3M Chairside Zirconia and Cerec Zirconia demonstrated a higher strength than Kuraray Katana STML. For all other properties, there were no differences between brands of zirconia.

111 - Vishnupriya Kurukundu and Dhara Patel

Alveolar Socket Grafting and Ridge Augmentation Failures Associated with Clindamycin Antibiotic Therapy: A Retrospective Study

V. Kurukundu, D. Patel, H. Basma

Objective: The aim of this retrospective study was to determine if a Clindamycin therapy may contribute to a higher incidence of bone augmentation complications and post surgical infections.

Method: This retrospective study analyzed patients who received bone augmentation procedures in the form socket grafting (SG) or ridge augmentation (RA) prior to placement of dental implants between 2014 and 2018 at the University of Alabama at Birmingham. All the grafting procedures were performed after preoperative oral antibiotic prophylaxis with amoxicillin 2 g per day continuing for 10 days, postoperatively. Clindamycin, with a daily oral dose of 1.2 g per day for 10 days, was prescribed to patients who reported a history of penicillin allergy. Bone augmentation failures were recorded as a complication that occurred in the first month of healing including suppuration from augmented site, dry socket and early membrane exposure.

Results: A total of 1,804 patients' files (430 RA and 2529 SG) were analyzed in this study. In the statistical analysis of the RA, out of the 16.5% of cases were allergic to penicillin; infection was noted in 22.5% of the cases. Of the 83.5% non-penicillin-allergic cases, 4.2% of patients presented with post operative infection ($p<0.0001$). In the analysis of SG, 10.7% out of 270 cases (10%) who were allergic to penicillin, reported post surgical infection; however only 2.7% out of the 2259 (90%) case who were not allergic to penicillin reported an infection ($p<0.0001$). Penicillin-allergic patients demonstrated a higher risk of bone augmentation failure with a risk ratio of 6.67 (95% CI) and 4.26 (95%) compared with nonallergic patients for RA and SG respectively.

Conclusions: Clindamycin therapy following SG and RA procedures was associated with a higher rate of infection, and seems to be a risk factor for post bone augmentation complications.

112 - Lauren Miele and Daniel Petersen

Analysis of Peri-implant Bone Loss in Relation to Posterior Implant Abutment Angle

L. Miele, D. Petersen, N. Geurs

Objective: To determine if the angle of the implant abutment influences maintenance of bone around the dental implant.

Method: A retrospective study was conducted at the University of Alabama at Birmingham School of Dentistry wherein 262 cases with restored posterior implants were analyzed for peri-implant bone loss. All screened patients underwent endosteal implant placement at one or more maxillary or mandibular

posterior site(s) with subsequent implant restorations between 2014-2019. Of the 262 original cases that were screened, 99 implants fit the radiographic criteria for evaluation in this study. Inclusion criteria for this analysis were limited to patients with calibrated, diagnostic quality radiographs of their implant at time of placement, at delivery of final restoration, and at the most recent subsequent follow-up appointment. Bitewing radiographs were generally preferred. However, periapical radiographs with clear implant threads indicative of acceptable parallelism were also included. The abutment angle was measured using the implant platform as the vertex, with one ray following the long axis of the implant and the other aligned with the gingival contour of the implant abutment. Bone loss was measured as the distance from the implant platform to the most apical extent of the bony defect along a line parallel to the long axis of the implant. These measurements were collected using MiPACS Dental Enterprise Viewer. Primary analysis of the numerical abutment angle and bone loss measurements was completed for both the mesial and distal surfaces of qualifying implants.

Results: The abutment angles associated with greater bone loss are of interest in part due to the variation in mesial and distal findings. The mesial angles of 160-169.999 degrees and distal angles of 140-149.999 degrees were associated with more bone loss, but these findings did not achieve statistical significance ($p = 0.31$ and $p=0.44$ respectively).

Conclusions: A large number of patients were excluded from this study due to lack of diagnostic quality radiographs at follow-up appointments, failure to obtain radiographs at patient recall appointments, and failure of patients to attend recall appointments. The data suggests the need to ensure implant follow up protocols are routinely carried out in the same manner between both the faculty and students of UABSOD, as well as ensuring that patients understand the importance of maintaining a healthy implant environment by attending their recall appointments. Further research with a larger cohort is needed to assess the relationship between implant abutments, restorations, and peri-implant bone loss.

113 - Bhrita Parikh and Nikhila Nemmarugommula

Combination Micro-abrasion and Resin Infiltration as Treatment for White Enamel Discolorations

B. Parikh, N. Nemmarugommula, C. Arce, N. Lawson

Objective: The aim of this study was to clinically assess the effectiveness of masking white spot enamel lesions using a resin infiltration technique.

Method: A healthy 25 years old Caucasian male with a chief complaint of white spot lesion on maxillary central incisors presented to UAB student clinic. The patient was seeking treatment with veneers, however, more conservative treatment options were presented to the patient. Case selection is critical for treatment of anterior discolorations to determine the depth of the lesion and whether it is superficial or deep. For the patient in this case report, the white discolorations were non-carious and transillumination suggested that the thickness of the lesions was within 150 microns of enamel and located in superficial enamel. A combination of micro-abrasion and resin infiltration was used to mask this white discoloration. A rubber dam was placed to protect the soft tissue and create isolation. A 6.6% hydrochloric acid and 30-150 micron silicon carbide abrasive paste was applied to the teeth (Opaluster, Ultradent) and scrubbed into the teeth with a rubber applicator for two 30 second intervals. Following micro-abrasion, the white discoloration was improved however still present. Resin infiltration was performed with ICON (DMG). A 15% hydrochloric acid was applied to the teeth for 2 minutes, an ethanol drying solution was applied for 2 minutes and a TEGDMA based resin infiltrant was applied and light cured. Finishing and polishing was done with enhance polishing points. The patient was also given a home bleaching kit pre and post treatment for two weeks.

Results: Comparison of the pre-operative and post-operative photographs reveal that the combination of micro-abrasion, resin infiltration, and home bleaching could mask an anterior white discoloration. This treatment method is a more conservative option than direct or indirect restorations.

Conclusions: Micro-abrasion, resin infiltration and bleaching should be evaluated as treatment options for anterior discolorations prior to treatment planning direct or indirect restorations.

114 - Neel Patel and Akshar Patel

Cutting Efficiency of Diamond Burs for Dental Zirconia

N. Patel, A. Patel, A. Nejat, N. Lawson

Objective: To evaluate cutting efficiency of diamond burs used for dental zirconia

Method: A zirconia block (Lava Esthetic, 3M ESPE) was sectioned into 5.4 mm thick sections with a lapidary saw. Specimens were then sintered according to the manufacturers recommendation resulting in a final thickness of 2.43 mm. Diamond burs were used to cut the zirconia blocks. in a custom UAB Bur Testing Device which used a computer controlled cutting turbine (40,000 RPM) with water spray (5.45L/min) and a 0.98N load. Two cuts were made on every zirconia block for 10 minutes each while using the same bur for both cuts. Four different diamond burs were tested(n=6). A digital light microscope with image analysis software was then used to measure the distance each cut made in the zirconia block. Representative zirconia specimens and diamond burs from each group were gold-coated and examined in a SEM (Quanta FEG 650, FEI) using the secondary electron (SE). The edges of the cutting surfaces were examined for edge chipping. Data were analyzed with 2-way ANOVA and Tukey post-hoc analysis for factors bur type and order of cut (i.e. first or second cut).

Results: Factors bur type, order of cut and their interaction were all significant ($p<.01$). There was no significant difference between cuts for the first cut, however, the NeoDiamond and Komet 4ZR burs produced longer cuts for the second cut. All burs showed significantly greater first cut than second cut. SEM imaging reveals that edge chipping can be observed on the cuts used with the Neodiamond, Komet 4ZR, and Komet 5856

Conclusions: The Neodiamond and Komet 4ZR burs appeared to be the most efficient for cutting through zirconia while the Zir-cut bur was the only bur which did not produce edge chipping. Therefore, the Neodiamond and Komet 4ZR can be recommended for crown removal whereas the Zir-cut may be advantageous for making access holes in zirconia crowns.

115 - Austin Meadows and Mark Schibler

Long Term Outcomes of Distraction Osteogenesis in Children

A. Meadows, M. Schibler, P. Waite, K. Powell

Objective: Micrognathic children exhibiting respiratory distress/failure and/or obstructive sleep apnea (OSA) are often indicated for mandibular distraction osteogenesis (MDO). Some of these children have had a tracheostomy prior to MDO surgery, but a large portion have not. This retrospective study examined the longterm effects of MDO on patients with and without a tracheostomy pre-operatively.

Method: Data was pulled from all MDO surgeries performed by Dr. Powell and Dr. Waite at Children's Hospital of Alabama from 2007-17. We were able to pull data for 34 patients. Patients were divided into two groups. Group 1 contained 18 patients who did not have a tracheostomy prior to mandibular distraction osteogenesis surgery. We examined whether these patients were able to avoid a tracheostomy post-operatively. We also examined pre- and post-operative polysomnograms to see if there had been any changes in patient's apnea-hypopnea index (AHI), which would indicate improvement of the patient's sleep apnea. Group 2 contained 14 patients who had a tracheostomy prior to mandibular distraction osteogenesis surgery. We examined whether the patient's were able to be decannulated following surgery, and how much time passed between surgery and decannulation. We also examined pre- and post-operative polysomnograms for this group to look for improvements in AHI.

Results: Group 1: 15/18 (83.3%) patients avoided a tracheostomy post-operatively. The average pre-operative AHI was 12.28. The average post-operative AHI was 4.36. The average change in AHI for patients with both pre-operative and post-operative polysomnograms was a reduction of 12.13.

Group 2: 10/14 (71.4%) of patients with tracheostomy were able to be decannulated after MDO. The average length of time between MDO and decannulation was 228.3 days. The average pre-operative AHI was 13.77. The average post-operative AHI was 1.99. The average change in AHI for patients with both pre-operative and post-operative polysomnograms was a reduction of 12.73.

Conclusions: Mandibular distraction osteogenesis likely can reduce the risk of tracheostomy in children indicated for mandibular distraction osteogenesis surgery. Mandibular distraction osteogenesis can also likely increase the chances of decannulation in children with a tracheostomy indicated for mandibular distraction osteogenesis surgery. Finally, mandibular distraction osteogenesis likely can reduce the post-operative apnea-hypoxia index of children diagnosed with obstructive sleep apnea that are indicated for mandibular distraction osteogenesis surgery. Further interdisciplinary studies involving a larger patient pool are needed to confirm these findings.

116 - Adriana Kelton and Ariosto Rosado

Shear Bond Strength of Core Materials

A. Kelton, A. Rosado, C. Arce, A. Robles, N. Lawson

Objective: To measure the shear bond strength (SBS) of four core build-up materials (Bulk-Fill One, Bulk EZ, Luxa Core and Core Paste) to dentin using universal adhesive with and without dual cure activator.

Method: 48 caries free human molar teeth were collected following IRB approval. The teeth were ground with abrasive disks (ending with 400 grit) to flatten enamel and dentin occlusal surfaces. Teeth were randomly divided in four groups (n=12): Bulk-Fill One (3M), Bulk EZ (Zest), Luxa core (DMG), Core Paste (DenMat). Scotchbond universal adhesive was applied to the flattened surfaces as self-etch mode for 15 seconds, air dispersed and light cured for 10 seconds (Elipar Deep Cure curing light, 3M Oral Care, irradiance>1020mW/cm²). Materials in groups 1-3 were bonded onto teeth via use of plastic tubing (1.76mm²) and light cured for 20 seconds. In group 4, BondLink Bond Enhancer was applied ontop of the cured Scotchbond Universal adhesive and air dispersed as per manufacturer's instructions. The Core Paste catalyst and paste were mixed by hand, the tubes were filled with material, and the material was allowed to self-cure for 3 minutes. All specimens were stored in an incubator at 37C in water for 48 hours and thermocycled for 10,000 cycles (5-55C, 30 second dwell time). All specimens were loaded in shear to failure,

at a 1mm/min cross-head speed. Bond strengths were calculated (all premature failures were given a value of 0) and data analyzed using 1-way ANOVAs and Tukey test ($p=.05$).

Results: There was a statistical difference in shear bond strength between materials ($p=.003$).

Conclusions: LuxaCore and CorePaste demonstrated a lower shear bond strength to dentin than a reference bulk fill composite.

117 - Bhumika Patel

Shear Bond Strength to Silver Diamine Fluoride Treated Dentin

B. Patel, N. Lawson, F. Farheen, S. Alhalees, J. Burgess

Objective: To measure and compare the shear bond strength of composite resin to carious dentin before and after treatment with a 38% silver diamine fluoride and potassium iodide (SDF+KI).

Method: The enamel of freshly extracted carious human teeth was removed from all teeth using a model grinder to expose the carious lesion. Soft caries was carefully removed until resistance was felt using a spoon excavator. Gr1 (control) received a coat of Scotchbond Universal (SBU) without prior etchant. Gr2-4 had a coat of SDF (Riva Star) applied followed by scrubbing a KI solution. SBU was then applied directly to Gr2 and applied to Gr3 following 15sec phosphoric acid etching. Gr4 was stored in PBS for 2 weeks and then received a coat of SBU without etchant. A 1.5mm diameter tube containing Filtek Supreme Ultra was applied over hard but carious dentin, and light-cured with a LED curing light (Deep Cure, irradiance $>1000\text{mW/cm}^2$). All specimens were then stored in PBS/980F in an incubator then placed into a fixture attached to the Instron Universal Testing machine. A shear load was applied (1mm/min) until failure. Shear bond strength was calculated. Data analyzed with analysis of variance (ANOVA) ($\alpha=0.05$).

Results: No statistical difference was found between groups ($p>0.05$) (mean \pm -SD): Gr1 (12.9 \pm -7.4MPa), Gr2 (16.5 \pm -10.3MPa), Gr3 (12.4 \pm -4.9MPa), Gr4 (14.6 \pm -7.2MPa).

Conclusions: Within the limitations of this study it can be concluded that applications of Riva Star (SDF+KI) does not affect bond strength of a Universal Adhesive (SBU) in either a self-etch or total-etch mode. Delayed application of the adhesive after SDF+KI does not affect the bond of the SDF to carious dentin.

118 - Umama Sayed and Jia Rao

Trends in Dental Implant Education, 2008-2019 UAB Undergraduate Experience

U. Sayed, J. Rao, C. Fu

Objective: To assess the trends of implant restorations at UAB School of Dentistry.

Method: Data collected from Salud EDR for the past 10 years using different ADA codes search.

Results: There has been a significant increase in number of implants placed over time from 2008 to 2019. Straumann is the most popular brand used for placing tooth supported implants. The use of custom abutments has increased over the years. Cement retained restorations have been popular as compared to screw retained restorations and the restorations have increased in numbers as well.

Conclusions: The data analysis demonstrating the overall experience for undergraduate students on dental implant is encouraging and satisfying.

119 - Parker Alison

Waistline to Gumline: Body Mass Index in Treated Periodontitis Patients

JP Alison, K. Martin, M. Geisinger

Objective: Periodontal disease affects 42% of adults in the US. It has been suggested that both the periodontal oral microbiome and host immuno-inflammatory response may be associated with overweight/obesity. This retrospective analysis sought to determine the association of periodontal disease parameters with body mass index (BMI) and obesity status in patients who had received prior treatment for periodontitis.

Method: 608 patients undergoing maintenance therapy who had been previously treated for periodontitis at the University of Alabama School of Dentistry (UAB) were assessed with regard to periodontal disease condition, self-reported body mass index, sites with probing depth (PD) > 3, missing teeth, gender, age, race/ethnicity, and bleeding on probing (BOP). Patients were determined to have moderate to severe periodontitis if they presented with ≥ 2 sites in 2 different quadrants with CAL ≥ 5 mm and PD ≥ 5 mm. Individuals were also categorized as being under/normal weight, overweight, and obese if they had BMI values of < 25 kg/m², 25-30 kg/m², and ≥ 30 kg/m². In this population BMI ranged from 16.827-51.389 kg/m², respectively.

Results: Chi-squared test was used to evaluate odds ratios for periodontitis status by obesity status. Periodontitis status was not statistically significantly associated with overweight and obese status (OR) of 1.388 [0.961-2.006] and 1.168 [CI 0.77-1.757], respectively. Female gender and age were negatively associated with periodontitis status (OR 0.561 [CI 0.343-0.918] and 0.983 [CI 0.967-0.999], respectively. Obese patients did demonstrate significantly more sites with BOP than either normal/underweight or overweight patients and Spearman Correlation Coefficients demonstrated that obesity status was associated with age and missing teeth ($p < 0.001$ and $p = 0.0064$, respectively).

Conclusions: In patients receiving periodontal maintenance who had received previous periodontal therapy, BMI was associated with age and missing teeth and obese status was associated with a significant increase in sites with BOP.

120 - Anusha Joseph

Clinical Case Report on Guided Tissue Regeneration Therapy Using Decalcified Freeze-dried Bone Allograft with Amnion-chorion Barrier to Treat Mandibular Class II and Class III Furcation

A. Joseph, A. Pizzini, M. Kaur

Objective: The purpose of this study was to evaluate guided tissue regeneration (GTR) therapy combining decalcified freeze-dried bone allograft (DFDBA) and amnion-chorion membrane to treat periodontally compromised teeth with class 2 and class 3 mandibular furcation (Hamp classification).

Method: 60-year-old Caucasian male with periodontally compromised teeth in lower left quadrant. Radiographic evaluation revealed > 50 % bone loss on #18 and #19. Clinical evaluation revealed: tooth#19 class III mobility and class II buccal furcation. Probing depth ranging from 2-8mm. tooth#18 class III mobility and class III furcation. Probing depth ranging from 2-8mm. According to the new WWDC 2017 Periodontal diagnosis: Stage 3 Grade C.

Patient consent obtained for periodontal regenerative surgery. Anesthesia achieved. Sulcular incision on buccal and lingual around teeth#s19,18,17. Full thickness mucoperiosteal flap reflected. Granulation tissue removed. Roots surfaces were treated with EDTA and bone graft (DFDBA) placed into the defects, Amnion-Chorion membrane was adjusted over the graft and the tooth. Flaps were approximated and sutured using modified vertical mattress with 5-0 vicryl suture. Teeth were splinted with composite to reduce mobility. Patient was seen for follow-up and then he was recalled for evaluation after 6 months and then one year

Results: Periapical radiograph shows complete bone fill inside the furcation on tooth#19 and partial bone fill on tooth#18. Gain in CAL, reduced probing depth ranging from 2-6mm in relation to, #19 and #18. Furcation defect on #19 reduced from class II to class I and #18 remains grade 3 but with improved Probing depth which allowed patient with better accessibility for maintaining oral hygiene resulted in better Gingival index and plaque index.

Conclusions: GTR combining DFBD and amnion-chorion membrane provided a favorable outcome to treat periodontally compromised teeth with class II furcation, limited results can be expected when approaching a class III furcation

121 - Bhakti Desai and Ray Dawkins

Patient Population Analysis at Sparks Dental Clinic

B. Desai, R. Dawkins, S. Mitchell

Objective: The objective of this retrospective study is to understand the patient demographics and needs at Sparks Dental Clinic.

Method: This IRB approved retrospective study analyzed patients seen at Sparks Dental Clinic over 5 years (n=8999). Average age, insurance coverage, gender, and race were recorded. An additional sample (N=100) of patient charts was further analyzed from the year 2018 to determine average Frankl Behavior Scale rating, sedative premedication used, city of residence, whether patient presented from group homes or private residence, medical diagnoses, and dental treatment rendered during that appointment.

Results: Average patient age was 32.2y. 55.14% were Caucasian, 40.97% were African American, and 2.11% were Hispanic. Medicaid insured 21.59% and 71.03% of patients were private pay. The primary diagnosis for 94.84% of patients was an intellectual disability. In 2018 (n=101), 59.41% presented from group homes, 41% required protective stabilization, and 24% required premedication. Frankl rating presented as follows: F1 (15%), F2 (21%), F3 (28%), F4 (36%). Recall visits made up 77.23% of the patient visits. 59% of patients presented from the greater metropolitan Birmingham area while 41% of patients presented from outside of Birmingham, AL.

Conclusions: The majority of patients seen are not insured and are adult patients with intellectual disabilities who were also well-behaved. This study points to the need for further analysis of access to care and the referral basis for patients with special healthcare needs.

122 - Athena Kenny

Investigating New Patient Adherence to Future Dental Appointments at a U.S. Dental School

A. Kenny, C. Robertson, C. McKenzie

Objective: This study utilized the modified Theory of Planned Behavior (TPB) to explore new patients' behavior related to scheduling and attending a future dental appointment.

Method: This study employed two phases of data collection. First, new patients arriving to the UAB School of Dentistry for a comprehensive treatment planning appointment completed a paper survey. Second, patient charts were accessed to determine whether the patient scheduled and attended a subsequent procedural appointment. This research was approved by the appropriate Institutional Review Board (IRB) before commencing.

Results: The patient charts indicated that 80 of the patients who received comprehensive treatment plan (61%) attended their first scheduled procedural appointment. Just over 10% of the new patients (N = 14) did not schedule a procedural appointment. Of those patients who did schedule a procedural appointment, 37 did not attend (31.6%). The modified TPB posits that attitudes/beliefs, social norms, and perceived behavioral control combined will predict intention and subsequent execution. Logistic regression analyses did not generate predictive models to fit this sample's data for either outcome of behavioral intention (scheduled) or execution (attended), respectively ($\chi^2 = 2.56$, $p = 0.464$; $\chi^2 = 1.99$, $p = 0.573$). Patient education level and business days elapsed between treatment planning and procedural appointments emerged as significant predictors. When combined in a logistic regression analysis, the model with both predictors was significant ($\chi^2 = 19.435$, $p = 0.001$). Specifically, only 14% of patients with higher education missed their scheduled appointment compared to 48% of patients without a 4-year college or advanced degree. For patients who had an appointment scheduled within two weeks, 19.6% did not attend, whereas 43% of scheduled appointments past this timeframe were not utilized.

Conclusions: The primary aim of this study was to investigate how well the modified TPB applied to dental care utilization within a dental school clinic. The results do not support utilizing the theoretical model to predict actual attendance at a dental appointment for the current sample as measured. Two key factors, patient education and length of time between appointments, were identified as predicting patient attendance in tandem.

123 - Holton Deatherage

Using 3D Imaging to Estimate Retromolar Intubation Feasibility

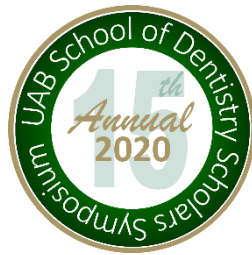
H. Deatherage, P. Mostofi, K. DiLuzio, P. Kukreja, S. Sittitavornwong

Objective: Using 3D imaging we measure the dimensions of retromolar space to assess the achievability of retromolar intubation in trauma patients undergoing fixation of facial fractures who require establishment of occlusion by maxillomandibular fixation (MMF). The retromolar intubation technique is a viable alternative for airway management compared to the more invasive and more commonly used techniques such as tracheostomy and submental intubation.

Method: Forty-one patient's ages 19-69 years old were included in this study, 24 males (21-69yo) and 17 females (19-60yo), with a total of 81 measurements. CT DICOM files from previously evaluated facial trauma patients by our department were obtained and 3D reconstructions of each patient's skull was created using 3D Slicer. The 3D model was cropped to include the area of interest, which included the mandible and maxilla. Two measurements, the distance from the distal contour of the 2nd mandibular molar to the ascending mandibular ramus (horizontal measurement) and the distance from the distal contour of the 2nd mandibular molar to the maxillary tuberosity (vertical measurement), were measured on each side of the mouth. A three-dimensional x-y-z plane was used to standardize the measurement.

Results: The retromolar areas calculated were statistically bigger than the reinforced oral ETT sizes 6.0 and 6.5 for both males and females ($p < 0.05$), but not statistically significant for reinforced oral ETT sizes 7.0, 7.5 and 8.0 ($p > 0.05$).

Conclusions: The retromolar route is a feasible option for intubation when using a reinforced ETT sizes 6.0 and 6.5. Enough space is available to correctly and safely position an ETT so that it does not interfere with establishing MMF during operative fixation of traumatic oral and maxillofacial injuries.



Basic Science / Post-Doctoral

124 - Zhaofei Li

Age Increases the Osteoclastogenic Potential of Myeloid-derived Suppressor Cells

Z. Li, Z. Chen, Y. Zhao, J. Katz, S. Michalek, P. Zhang

Objective: Aging is a risk factor for bone loss, including periodontal bone loss. However, the mechanism(s) underlying age-associated bone loss is not fully understood. Myeloid-derived suppressor cells (MDSC) are a heterogeneous population of immature myeloid cells with immunosuppressive functions. There is also convincing evidence that MDSC are involved in bone destruction. Therefore, the objective of this study was to determine if age-related bone loss is associated with an increase in the frequency and function of MDSC.

Method: Alveolar bone and femurs were isolated from three different age groups (8-12 weeks, 11-12 months, and > 18 months) of C57BL/6 wild type mice and analyzed for bone loss using microcomputed tomography. The percentage of MDSC in the BM and spleen were determined by flow cytometry. The MDSC were then sorted out from young and old mice and analyzed for RANKL-induced osteoclastogenesis. The effect of MDSC on antigen-specific T cell proliferation was also analyzed.

Results: In comparison with young mice, aging mice displayed a significant increase in bone loss and an increase in the frequency of MDSC in the bone marrow and spleen. In addition, aging enhanced osteoclast differentiation and the bone resorptive activity of the CD11b+Ly6C++Ly6G+ subpopulation of MDSC. CD11b+Ly6C++Ly6G+ MDSC from old compared to young mice expressed an increased level of c-fms, and these cells were more sensitive to RANKL-induced osteoclast gene expression. Furthermore, CD11b+Ly6C++Ly6G+ MDSC from old mice showed an increase in antigen-specific T cell suppressive function compared to cells from young mice.

Conclusions: Our data suggest that the age-related expansion and increase in the osteoclastogenic potential of MDSC may contribute to age-associated bone loss.

125 - Burthia Booker

Ameloblastoma Imaging In Vivo With Intraoperative Fluorescent Detection

B. Booker, B. Idigo, L. Moore, J. Warram, E. Rosenthal, A. Morlandt, H. Amm

Objective: Ameloblastomas demonstrate locally aggressive and destructive behavior, primarily in the posterior mandible. Wide variability in the efficacy of surgical treatment options has resulted in residual disease and a vast range of disease recurrence (3-62%). It has been previously demonstrated that fluorescently labeled epidermal growth factor receptor (EGFR) antibodies can successfully identify microscopic tumors in multiple in vivo preclinical models of human cancers with limited toxicity.

The objective is to demonstrate the specificity and sensitivity of a fluorescently labeled anti-EGFR antibody, cetuximab-IRDye800CW, to ameloblastoma tumors in vivo using the LUNA FLI device; an open-field, intraoperative optical imaging device.

Method: Patient-derived xenografts (PDX) of ameloblastoma were implanted subcutaneously into the flanks of immunocompromised mice and were imaged following tail vein injection of cetuximab-IRDye800CW or IgGIRDye800CW to label tumor cells.

Results: PDX tumor imaging revealed the tumor-to-background ratios (TBRs) produced by cetuximab were significantly higher than those produced by IgG. Following skin flap removal to represent a pre-resection state, TBRs with cetuximab were significantly higher than the IgG control for PDX tumors derived from three ameloblastoma patients (AB-20 and AB-34, $p < 0.01$; AB-33, $p < 0.05$, respectively). Excised PDX tissues were paraffin-embedded to confirm the presence of tumor by optical imaging and H&E staining. EGFR expression was confirmed by immunohistochemistry.

Conclusions: Fluorescently labeled anti-EGFR demonstrates specificity and sensitivity for PDX tumor xenografts using an open-field, near-infrared imaging system. This approach would allow real-time assessment of fluorescent signal during surgical removal of tumors. Surgeons would be able to more confidently remove ameloblastomas by accurately assessing tumor margins to improve long-term local tumor control and reduce recurrence in this patient population.

126 - Alex Dalecki

Copper-dependent Inhibitor GTSM as a Fast-acting Bactericidal Agent Against *Streptococcus mutans*

A. Dalecki, O. Kutsch

Objective: *Streptococcus mutans*, a major etiologic agent of dental caries, is one of the most prevalent infectious diseases worldwide. Though rigid adherence to daily dental hygiene schedules can often control caries progression, longer lasting treatments are necessary to reduce disease burden. Our objective was to assess whether copper-dependent inhibitors, small organic molecules that gain significant antibacterial properties when combined with copper, could serve as a treatment for *S. mutans*.

Method: A panel of known CDIs was screened against *S. mutans* in standard dose-response challenge curves using rich growth medium. Dose matrices to determine necessary copper concentration were conducted by diluting components separately at 2x concentration and then combining. Time-to-death experiments used 10-fold dilutions that were then dropped on rich agar media for recovery.

Results: Glyoxal-bis(N4-methylthiosemicarbazone), or GTSM, was found to be highly active against *S. mutans* with an MIC of $1.25\mu\text{M}$. This inhibition only required roughly equimolar copper for activity, which is well below physiological levels in saliva. Killing was evident within 30 minutes at higher concentrations, and by two hours at the MIC.

Conclusions: GTSM displays remarkable ability to kill *S. mutans* when combined with small amounts of copper, a ubiquitous environmental metal. CDIs such as this may offer an avenue for targeting oral pathogens like a traditional infection in order to reduce caries burden.

127 - Yanfang Zhao

Dpy30 Regulates RANKL-mediated Osteoclastogenesis

Y. Zhao, Z. Li, X. Feng, H. Jiang, J. Katz, S. Michalek, P. Zhang

Objective: Osteoclasts (OC) are the primary bone resorption cells that are critical for homeostatic bone remodeling and pathological bone resorption. Increasing evidence indicates an important role of epigenetic regulation in osteoclastogenesis. Histone H3K4 methylation is one of the most prominent of epigenetic modifications and the Set1/MII complexes is the major histone H3K4 methyltransferases in mammals. Dpy30 is a common core subunit of all Set1/MII complexes and is believed to play an important role in

regulating fundamental cellular processes including growth and differentiation, especially in the hematopoietic system. In this study, we investigated the role of Dpy30 during RANKL-mediated osteoclast formation.

Method: Conditional knockout mice were generated by deleting the Dpy30 gene in osteoclast precursors via LysM-Cre to examine its role in OC differentiation and function. Firstly, we used micro-CT to analyze bone phenotype, as well as histology to detect osteoclast activity. Then, TRAP, F-actin ring and WGA staining were used to identify if Dpy30 deletion in osteoclast precursors influences osteoclast differentiation and activity. The expression of OC genes and proteins was analyzed and we also determined if these changes were related to changes in H3K4 methylation activity.

Results: Dpy30 expression was changed during RANKL-mediated osteoclastogenesis in vitro. Dpy30^{f/f}; LysM-Cre mice exhibited increased bone mass due to impaired osteoclast formation and activity. Furthermore, ex vivo analysis demonstrated that Dpy30 conditional deletion significantly reduced OCs differentiation and activity. Dpy30 deficiency suppresses the expressions of OCs-related genes and proteins. Dpy30 deletion also resulted in downregulation of the H3K4 methylation activity during OC differentiation.

Conclusions: Collectively, we have identified a novel role of Dpy30 in regulating RANKL-mediated osteoclastogenesis. Dpy30 could be as a promising therapeutic target for bone loss by targeting OC differentiation and activity.

128 - Delores Stacks

In Silico Analysis of Limb Bud Formation in the Prrx1-Cre Anti-microRNA 23a Cluster Mouse Model

D. Stacks, B. Wildman, Y. Chen, A. Williams, T. Busby, Q. Hassan

Objective: The microRNA cluster 23a-27a-24-2 (miR23a cluster) inhibits osteogenesis by repressing the Runx2 – Ezh2 axis of osteoblast differentiation. We established a murine phenotype of increased trabecular and cortical bone when the miR-23a cluster was repressed in a Col1a1-Cre anti-miR-23a cluster mutant model. Col1a1 is expressed in committed osteoblasts as the collagen matrix is created prior to mineralization, which occurs in the mouse at days E18.5 and PN18. By changing the conditions of expression to an earlier time course using a Prrx1 promoter driven Cre, which is expressed at day E9.5, the resulting offspring exhibit a unilateral rostral limb malformation phenotype that expresses with incomplete penetrance. Before beginning in vivo experiments to determine the cause of this abnormality, we surveyed mRNA seed sequences in the 3' UTR that match the miR23a cluster and its components to find possible targets for transcriptional interruption.

Method: Here we utilized three different in silico methods of miRNA target prediction to determine if limb bud proteins are affected by members of or the entire miR23a cluster. Gene ontology analysis was used to classify genes into their respective functions and pathways.

- 1) Diana Tools: <http://diana.imis.athena-innovation.gr/DianaTools/index.php>
- 2) Pictar: <https://pictar.mdc-berlin.de/>
- 3) Target Scan: http://www.targetscan.org/vert_72/
- 4) Panther Pathway Analysis: <http://www.pantherdb.org/>

Results: 626 possible miR23a cluster gene targets were identified. 8 molecular functions, 13 biological processes, 7 cellular components, 22 protein classes, and 85 pathways were recognized based on gene ontology terms. Notably, bone morphogenetic protein (BMP) signaling, Fibroblast growth factor signaling, Wnt signaling, Hedgehog signaling, Notch signaling, and TGF-beta signaling pathways are possible targets and are interesting due to their notoriety for being vital to osteogenesis and limb bud development.

Conclusions: Computational prediction verifies that pathways involved in limb bud development are likely affected when the miR23a cluster is repressed at an early embryonic stage. Future plans include histological assessment of the embryonic limb bud, microCT of adult cortical and trabecular bone, and RNA sequencing of isolated limb bud tissue.

129 - Yuechuan Chen

LncRNA Dio3os: A Missing Link Between Thyroid Hormone Metabolism and Skeletogenesis

Y. Chen, B. Wildman, Q. Hassan

Objective: Mesenchymal osteoblast precursors translate into mature osteoblast and osteocyte through the program osteoblastogenesis. This program is defined by multiple genetic and epigenetic events at stages of development, formation and maintenance of bone tissue. LncRNAs are classified as a unique class of long RNA transcripts which lacks the translational potential, and influence the chromatin state of protein-coding genes. A few of these lncRNAs have been shown to regulate osteoblastogenesis. However, the mechanism of lncRNA function in osteoblastogenesis is not clear yet. Here we identified a lncRNA named Dio3os in the proximity of iodothyronine deiodinase 3 (Dio3), coded by the opposite strand of Dio3 locus, was significantly decreased during osteoblast differentiation similar to those of Dio3. More important, Thyroid hormone T4 induce both of lncRNA Dio3os and Dio3. Based on these findings, We tried to identify that lncRNA Dio3os can positively regulates neighbor coding gene Dio3 and negatively regulates osteoblast formation and differentiation.

Method: lncRNA Dio3os was investigated in differentiating MC3T3-E1 cells using Quantitative reverse transcription and real-time PCR. Additionally, we treat MC3T3-E1 cells with or without T4 in osteogenesis differentiation medium. To confirm the function of lncRNA Dio3os on osteogenesis, we have established the stable overexpression or knock out lncRNA Dio3os in MC3T3-E1. We also performed biotin RNA pull down assay for endogenous bait protein(s) of interesting followed by the mass spectrometry for the identification of the interacting partners. RNA-IP and CHIP were applied to confirm the lncRNA Dio3os interacting partners and function mechanisms.

Results: lncRNA Dio3os positively controls the neighbor coding gene Dio3, but inhibits the osteoblast formation and differentiation. More importantly, when lncRNA Dio3os was knocked out it aborted the T4 function on osteoblastogenesis. Functionally, RNA pull down assay and RNA-IP shows that lncRNADio3os interacts with NuRD complex.

Conclusions: Our studies have identified lncRNA Dio3os positively control the neighbor coding gene Dio3 in cis but negatively regulates the osteogenesis in trans. In addition, lncRNA Dio3os may interacts with NuRD complex to control the thyroid hormone metabolism on bone

130 - Harunur Rashid

Runx2 Activity in Hypertrophic Chondrocytes Regulates Resorption of Calcified Cartilage

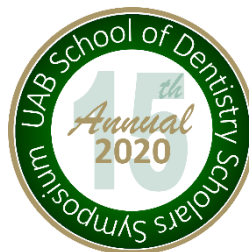
H. Rashid, H. Chen, A. Javed

Objective: Global deletion of the Runx2-gene results in complete failure of mineralized tissue formation and embryonic-lethality. Deletion of the Runx2-gene specifically in the resting chondrocyte blocks chondrocyte differentiation and endochondral ossification. The expression of the Runx2-gene increases from resting to hypertrophic-chondrocytes. However, Runx2 role in hypertrophic chondrocytes is unknown.

Method: Collagen type X-Cre model was used to delete the Runx2-gene in hypertrophic chondrocytes. Molecular and histologic techniques were used to analyze osteogenesis.

Results: Newborn mice lacking the Runx2-gene in hypertrophic chondrocytes (Runx2HC) have a well-formed skeleton but long bones are short with unmineralized extremities. Histologic analysis revealed the length of the hypertrophic zone is double in Runx2HC bones. TUNEL assay confirmed that decrease apoptosis of Runx2 deficient hypertrophic chondrocytes leads to the expansion of the hypertrophic zone. Compared to WT littermates, Runx2HC bones contain a large amount of calcified cartilage. RNA analysis showed that poor cartilage resorption in Runx2HC bones is due to a significant decrease in the expression of matrix-metalloproteinases. Interestingly, μ CT showed a 3-fold increase in the trabecular bone but the cortical bones were comparable among the littermates. To better understand the poor resorption of calcified cartilage and increased trabecular bone in Runx2HC mice, we evaluated osteoclasts. The number of TRAP-positive osteoclasts was decreased by 30% in Runx2HC bones. Consistent with these results the Rankl/Opg ratio was decreased in mutant bones. Importantly, the expanded zone of hypertrophy and unresorbed calcified cartilage persists in the adult mice. Histologic and μ CT analysis of 2.5-month old littermates revealed a locally osteopetrotic phenotype in the mutant bones. Dynamic histomorphometric analysis indicated a 40% decrease in the osteoclasts number but the number osteoblast and bone formation rate are comparable. Our results demonstrate that high trabecular bone mass is due to poor bone resorption and not linked to increased bone synthesis.

Conclusion: Runx2 activity after hypertrophy is essential for degradation and resorption of calcified cartilage.



131 - Daniel Burgin

A Multidisciplinary Approach to Treating Dentoalveolar Trauma in the Esthetic Zone

D. Burgin, D. Givan, K. Kinderknecht, C. Fu

Objective: The objective for this case study was to treat dentoalveolar trauma in the esthetic zone both surgically and prosthetically in a highly predictable manner.

Method: A 65-year old female presented following multiple traumatic events to the anterior maxilla resulting in the loss of #6, 7 and supporting hard and soft tissues. Following periodontal evaluation, #5 and #8 were deemed periodontally hopeless. A diagnostic wax up and a CBCT scan were performed. The patient was treatment planned for extraction of #5, 8, vertical and horizontal ridge augmentation, and placement of three bone-level tapered implants (Straumann BLT) at sites #5, 7, 8. Grafting was performed in the Graduate Periodontal clinic and the patient returned for implant placement 6 months later without complication. Implants were placed with surgical guides fabricated from the diagnostic wax up. Following 4 months of integration, an acrylic screw-retained provisional was fabricated chairside. A conventional PVS final impressions was made using an open-tray technique and customized impression posts. The zirconia substructure was planned following the contours of the provisional and was tried in for passive seating and cleansibility. Custom shade selection for veneering porcelain was performed chairside with the ceramist.

Results: A four-unit, screw-retained porcelain fused to zirconia FP-3 restoration was fabricated for the patient with custom shading for the teeth and gingiva. This gave an esthetic result for the patient with a high level of predictability. Proper communication between the restorative dentist, surgeon, and technician was required to achieve this outcome.

Conclusions: Following acute dentoalveolar trauma, loss of both hard and soft tissues must be addressed by the restorative practitioner. It is critical early in treatment to decide whether replacement should be done with natural tissues or prosthetics. Often this decision is not made until after grafting procedures have been attempted and deemed esthetically inadequate. Given the planning for prosthetic replacement of missing hard and soft tissues rather than making attempts to replace them entirely surgically, the esthetic outcome was predictable in this case.

132 - John Le

A Case of Dyskeratosis Congenita with Squamous Cell Carcinoma of the Maxilla: A Case Report and Review of the Literature

J. Le, M. Kase, A. Morlandt

Objective: Dyskeratosis congenita (DC) is commonly diagnosed clinically with three classic findings of 1) oral leukoplakia, 2) nail dystrophy, and 3) abnormal skin pigmentation. It is commonly associated with bone marrow failure, increased predisposition for malignancies and a variety of additional somatic features. Nearly 70% of patients with DC present with oral leukoplakia, a lesion with up to a 34% chance of malignant transformation [5,13]. Although oral squamous cell carcinoma (OSCC) is the most common malignant transformation of long-standing leukoplakia, a limited number of cases have been reported in patients with DC. Most of which, involved the tongue and buccal mucosa.

Method: A retrospective chart review and literature review of DC and OSCC was completed for this article.

Results: We present a patient with DC who presented with OSCC involving the maxilla. The patient underwent a partial maxillectomy, skin grafting and obturator placement. There was no evidence of recurrence or new disease at the 15-month mark.

Conclusions: OSCC in patients with DC is uncommon, but with close surveillance and thorough oral cavity examinations by a health professional, malignant transformations can be detected and treated at an early stage.

133 - Ryan Seeley and Lee Maniscalco

A Retrospective Analysis of Dental Implants Placed at the University of Alabama at Birmingham School of Dentistry Oral and Maxillofacial Surgery Clinic

R. Seeley, L. Maniscalco, P. Louis

Objective: We reviewed the electronic dental record (EDR) to review the success of implants placed in the University of Alabama at Birmingham School of Dentistry Oral and Maxillofacial Surgery Clinic by residents over a 5 year period. The objective of the study is to compare the medical problems and follow up rates of our patient population with the national averages. We also analyze the outcome of dental implant success at an academic setting.

Method: A review of the electronic dental record was performed to find all dental implants placed by residents at the UAB School of Dentistry Oral & Maxillofacial Clinic between 7/2013 and 12/2017. Clinical records, radiographs, and restorative records were reviewed and recorded. Patients with incomplete documentation and those who never returned after initial implant placement were excluded. Medical history was reviewed in the EDR and histories of tobacco use, bisphosphonate use, osteoporosis, diabetes mellitus (DM), head and neck radiation, postmenopausal estrogen use, other autoimmune diseases, gastroesophageal reflux (GERD), selective serotonin reuptake inhibitors,(SSRI) and serotonin norepinephrine reuptake (SNRI) inhibitors were recorded. Follow up rates and radiographic review was performed and placed implants into three categories based crestal bone level at year one to year five compared with bone levels at the time of implant placement. Class I,II, and III were defined as bone level within 0-2 mm, greater than 2-3mm, and >3mm of bone level from the time of implant placement respectively.

Results: 463 Patients were identified as having implants placed at the school of dentistry. 52 patients were excluded who had incomplete records in the EDR. 19 of the remaining 411 patients had implants placed and never returned to the School of Dentistry for follow up after the day of placement. The Final 392 patients (217 female, 55%; 175 male, 45%) had 722 Implants placed between 7/2013 and 12/2017. The Average age was 62 years old (range: 20-90 years old). 48 implants (6.65%) were loaded or had healing abutments placed at the time of implant placement. Of the remaining implants, uncoverly ranged from 0.4 - 17 months with an average of 5 months. Biohorizon was the primary implant placed (680, 94.2%), followed by Nobel Biocare (21, 2.9%) and Biomet 20, 2.7%, and Straumann (1, 0.14%). Implants were restored by dental students, residents, faculty, and outside dentists and were made up of two implant supported overdenture (347, 48.06%), crowns (304, 42.11%), Fixed Hybrid (48, 6.65%), Fixed Partial dentures (17,2.35%), implant supported removable partial dentures (7, 0.97%). Adjunctive procedures were needed in 34 patients (8.6%) and consisted most commonly of Guided bone regeneration (12, 34.28%), Direct sinus lift (11, 31.43%), Guided tissue regeneration (6, 17.14%), indirect sinus lift (6, 17.14%).

Our patient population had the following medical problems: GERD (91, 23.27%), DM (83, 21.23%), Current Smokers (70, 17.65%), SSRI use (42, 10.49%), Bruxism (40, 10.23%), Post menopausal estrogen use (29,

7.16%), Other Autoimmune diseases (19, 5.96%), SNRI use (23, 5.88%), Inhaled steroid use (22, 5.63%), Osteoporosis (21, 5.37%), Rheumatoid Arthritis (14, 3.58%), smokeless tobacco use (11, 2.81%), Oral Steroid use (11, 2.81%), Head and Neck Radiation history (6, 1.53%). Bisphosphonate use (7, 1.79%) was limited to patients on oral bisphosphonates and IV use of less than 1 year.

Following implant placement 158 patient (40.3%) did not have radiographic follow-up after uncover. The remaining 234 patients were categorized into having less than 6 month radiographic follow-up (11, 4.7%), 6-12 months radiographic follow-up (148, 63.2%), 48 month radiographic follow up (10, 4.27%), 36 month radiographic follow-up (47, 20%), and 60 month radiographic follow-up (8, 3.4%). 224 (95.7%) patients had less than 2mm of bone loss on all postoperative radiographs.

Amongst this patient population and date range, 25 patients(6.3%) and 34 implants failed (4.71%). Of these 25 patients, medical history was significant for: current smoker (7, 28%), DM (5, 20%), bruxism (3, 12%), SSRI use (3, 12%), post menopausal estrogen use (3, 12%), GERD (2, 8%), smokeless tobacco use (1, 4%).

Conclusions: The implant success at the UAB School of Dentistry Oral & Maxillofacial Clinic was found to be similar to the reported implant success rate by multiple studies regarding implant success. Our patient population's follow up rates are low, which can prevent early detection of problems. Additionally, the dental school setting is poorly set up to routinely follow implant patients. Lack continuity of care in the dental student clinic (due to graduation and patient reassignments) and no protocol for following or checking dental implants on the student level further complicate the situation. Further discussion should be had to establish a long term clinical and radiographic follow up and maintenance protocol with licensed practitioners to increase continuity of care.

134 - Pasha Mostofi

Achieving Facial Esthetic and Prosthodontic Outcomes with a Novel Plate Design

P. Mostofi, Y. Ying, A. Morlandt

Objective: The use of the osteocutaneous free flap has become the gold standard in reconstruction of large bony defects of the mandible due to aggressive disease processes. While providing excellent bone and tissue supply to fill these large defects, the challenge of restoring both the form and function that the mandible provides for both the oral cavity and the face requires further innovation and improvement. To accomplish this, oral rehabilitation with osseointegrated dental implants must be addressed, in addition to the discrepancy between the mismatched heights of the disease-free native mandibular bone and the implanted fibula. In this paper, we introduce a novel technique which involves using selective laser melting (SLM) to design custom reconstruction plates that help in superior positioning of the fibula for optimal implant placement and restoration while addressing the remainder of the mandibular height discrepancy with the custom reconstruction plate extending to the inferior border of the mandible to render a more symmetric and esthetic facial contour of the patient's face, thus both restoring a large defect and optimizing the ability to restore form and function of the missing mandibular bone.

Method: Inclusion criteria for this study required patients who underwent extensive mandibular resection due to either benign or malignant oral pathology requiring reconstruction with an osteocutaneous fibula free flap (OC-FFF). Computerized Tomography (CT) within 6 months of each procedure was taken and the Digital Imaging and Communications in Medicine (DICOM) format of each patient's CT was provided to KLS to design a custom reconstruction plate using their Selective Laser Melting (SLM) technology with titanium

alloy. All surgeries were performed at the University of Alabama at Birmingham (UAB) by the Department of Oral and Maxillofacial Surgery by the same two surgeons implementing the two-team model approach in respect to ablative and reconstructive portions of the surgeries. Once the osteocutaneous free flap was harvested and used to reconstruct the mandibular defect it was secured with the custom-milled reconstructive plate unique to each patient's defect with the fibula positioned superiorly towards the superior border of the native mandibular bone and the custom plate positioned inferiorly to be contiguous with the inferior border of the mandible. Each patient had post-operative Panorex and CT Facial imaging taken to visualize the custom plate position relative to the reconstructed osteocutaneous fibula free flap. CT DICOM files from each patient was obtained and 3D reconstructions of each patient's skull was created using the freeware software 3D Slicer13. Some patients were also asked to have clinical pictures taken at their most recent follow-up visit to assess esthetic outcomes. All patients were asked to participate in a questionnaire asking questions in regards to post-operative discomfort and pain, function, esthetics and overall satisfaction with the outcome of the procedure. The answers to these questionnaires were recorded for each category.

Results: To date, eight patient's have undergone OC-FFF surgery using our novel plate design. Five of those eight patient's agreed to be part of this study. Two patient's who initially agreed to participate were lost to follow-up and one patient refused to participate due to privacy concerns. The 5 patients who participated in this retrospective study were between ages 32 - 65 years old (mean 51.6 years old); three females and two males. Two patients were diagnosed with Ossifying Fibroma, one with Ameloblastoma, one with Stage 3 Osteoradionecrosis and one with Leiomyosarcoma. All surgeries were performed between 12/21/16 and 5/8/18. The time since surgery for each patients ranged from 8 month – 37 months. The questionnaire administered covered topics concerning post-operative discomfort/pain, jaw function, esthetics and overall satisfaction. Four patients reported "no pain or discomfort" with the reconstructed portion of their jaw, while one patient reported only "minimal discomfort". Two patients reported "excellent" jaw function and three patient reported "good" jaw function. Three patients reported no change to the esthetics of their face after the surgery, one reported some degree of facial asymmetry post-operatively, and one patient reported improved symmetry post-operatively. Four patients reported they were "very satisfied" with their appearance post-operatively, while one patient reported they were "moderately satisfied." All five patients reported they were "very satisfied" with the function of their jaws post-operatively. Lastly, all five patients reported they would recommend this particular operation to a friend or family member if they acquired the same medical condition.

Conclusions: In this paper, we present the use of a novel plate design, unique to each patient, using SLM technology to position the OC-FFF superiorly to allow optimal placement of dental implants for oral functional rehabilitation while allowing the shape and design of the custom plate to extend to the inferior border of the mandible, hence matching the height of the native mandible to help achieve better prosthodontic and esthetic outcome. From the feedback provided by the five patients in our study who underwent reconstructive surgery with our novel plate design, we are able to appreciate that post-operative jaw function, esthetics and patient satisfaction were ranked favorably. The use of this novel plate design did not add any additional steps in surgery, furthering operative time or requiring longer patient recovery. We believe the addition of this novel design provides an innovative technique for using the current gold standard in reconstruction of large mandibular defects and further suggest that other Head and Neck surgeons consider its use for better patient outcomes in prosthodontic and facial esthetics outcomes.

135 - Paul Lewis

An Institutional Review of Le Fort One Osteotomy with Rigid External Distraction in a Large Series of Cleft Lip and Palate Patients

P. Lewis, P. Waite, K. Powell

Objective: The purpose of this study was to review the University of Alabama at Birmingham's experience with Le Fort one (LF 1) osteotomy with rigid external distraction (RED) in a large series of cleft lip and palate patients to determine if anterior iliac crest bone grafting (ICBG) in the early mixed dentition (6-8 years of age) rather than the late mixed dentition (9-12 years of age) leads to an increased number of patients undergoing LF 1 with RED.

Method: A retrospective chart review of 223 patients that underwent ICBG to an alveolar cleft by a single surgeon from 2010 through 2015 with some patients undergoing subsequent LF 1 with RED by the same provider was conducted. Patients with follow-up less than 2 years (75), surgery age greater than 12 (18), current age less than 12 (16), and those with known syndromes (10) were excluded. In total, 104 cases were included in this review. Statistical analysis was completed to determine if patients that underwent ICBG in the early mixed dentition were more likely to undergo LF 1 with RED than patients who underwent ICBG between the ages of 9 and 12.

Results: 84 patients underwent ICBG before age 9, and 32 of these patients went on to undergo LF 1 with RED. 20 patients underwent ICBG between the ages of 9 and 12, and 5 of these patients went on to undergo LF 1 with RED. Chi-square analyses showed no statistically significant difference in the frequency of LF1 with RED between the two age groups when evaluated as a whole. There was also no statistically significant difference in the frequency of LF1 with RED when the groups were further stratified and the analysis was done with unilateral and bilateral cleft patients independently.

Conclusions: Patients that undergo ICBG for alveolar cleft at a young age are not more likely to undergo RED following the UAB management protocol.

136 - Chan-Te Huang

Artificial Caries Model for Bioactive Restorative Materials

C.T. Huang, A. Martin, D. Wang, J. Burgess, N. Lawson

Objective: To compare ability of two bioactive materials to prevent demineralization in artificial caries model to a resin composite and resin-modified glass ionomer (RMGI) material.

Method: Preparations were made at the CEJ of extracted human molars (40, n=10/material) and restored with two bioactive materials (Experimental composite 019, Pulpdent Corp. and Cention N, Ivoclar Vivadent), a composite (Filtek Supreme 3M/ESPE, and a RMGI (Fuji II LC, GC). All materials (other than the RMGI) were used with an adhesive (Scotchbond Universal, 3M/ESPE) in the self-etch mode which was light cured for 10sec. All restorative materials were light cured for 20sec then finished with a polishing disc. Teeth were incubated (37°C) for 24hr in water. An acid-resistant varnish was painted onto the teeth around the restoration, leaving a 2mm border of uncovered tooth. A demineralization solution composed of 0.1M lactic acid, 3mM Ca₃(PO₄)₂, 0.1% thymol, and NaOH (to adjust pH=4.5) and a remineralization solution composed of 1.5mM Ca, 0.9mM P, and 20mM Tris(hydroxymethyl)-aminomethane (pH=7.0) were prepared. Specimens were placed in the demineralization gel for 4hrs followed by the remineralization solution for 20hrs and

cycled daily for 30 days. Then, specimens were embedded, sectioned into 100 μ m sections, and the interface between the restorative and cementum margin was viewed with polarized light. A line was drawn parallel with the zone of demineralization for each tooth. The area of “inhibition” (defined as the area external to the line) or “wall lesion” (defined as the area internal to the line) was traced with internal image evaluation software and measured. Areas of inhibition were measured as positive values and areas of wall lesions were measured as negative values.

Results: A 1-way ANOVA found significant differences between materials for “inhibition/wall lesion” areas in cementum ($p < .001$). Tukey post-hoc analysis ranked materials (μm^2 , mean \pm SD) : Fuji II LC (5412 \pm 2754) > Cention N (2768 \pm 1576) and Experimental composite 019 (1484 \pm 1585) > Filtek Supreme Ultra (-1119 \pm 1029).

Conclusions: The Experimental composite 019 and Cention N bioactive materials (used with an adhesive) showed net areas of demineralization inhibition greater than a reference resin composite, albeit at a lower level than a reference RMGI material.

137 - Chad Dammling

External Pin Fixation for Temporary Stabilization of Mandibular Fractures and Mandibular Pathology: A Contemporary Review and Case Series of a Traditional Technique

C. Dammling, E. Park, T. Whatley

Objective: External pin fixation of the mandible is a subtype of closed reduction that remains a suitable treatment option for stabilization of mandibular fractures and mandibular pathology given the appropriate indications. The device allows for preservation of periosteal blood supply and transcervical dissection planes. Moreover, this strategy allows for wound temporization until the soft tissue is optimized before definitive treatment, if necessary. The purpose of the article is to review management of mandibular defects with external pin fixation and to evaluate its use for mandibular fractures and pathology at our institution.

Method: A retrospective chart review was performed on all patients that were treated with external pin fixation devices of the mandible during a five-year period. Patients were considered eligible for inclusion if they were monitored throughout the entire treatment course with external pin fixation. Patients were evaluated for overall treatment time, final treatment outcome, and complications of device placement including: pin site infection, pin loosening, paresthesia, bleeding, and persistent infection.

Results: A total of 20 patients were identified with an average age of 46 years old (21-74) at time of treatment. Fourteen patients were treated for mandibular trauma while the remaining six were treated for mandibular pathology. No pin site infections, pin loosening, paresthesia attributed to device placement, or bleeding were reported throughout the treatment period. Two of the patients developed persistent infections at the defect site which was attributed to the initial injury severity, rather than the device itself.

Conclusions: External pin fixation allows for minimal manipulation of soft tissue and periosteum of the mandible, while also defining and maintaining mandibular width and bilateral segment relationship during initial management. Open reduction and internal fixation (ORIF) remains the gold standard for the majority of patients but external pin fixation devices should still be considered in certain scenarios.

138 - Yi-Fan Zhang

Development of Natural Language Processing Algorithm for Dental Charting

Y.F. Zhang, B. Bogard, C. Zhang, N. Childers, S. Mitchell, J. Jackson, K. Cheon, M. Robinson

Objective: The purpose was to develop a natural language processing algorithm which will input data from oral examination transcripts to a structured database.

Method: A natural language processing algorithm was developed in JAVA to record clinical variables. Four case vignettes were produced for primary, mixed, and permanent dentition patients with varying degree of soft tissue pathology, caries, existing restorations and occlusion relationships. After calibration, dental students were instructed to perform simulated oral examinations based on the case vignettes, using natural language as they would to an assistant who was charting the case. They also listened to voice recordings of other volunteers' simulated oral examinations and filled in paper charts. The transcripts were processed with the algorithm. The accuracy of the human subjects and the algorithm were calculated.

Results: The case vignettes had an average of 56 data points. Twelve simulated oral examinations were performed. The accuracy of human charting from recordings was 84%. The accuracy of algorithm extracting data from transcripts was 93%.

Conclusions: Human charting was found to have considerable errors requiring additional personnel training. The natural language processing algorithm serves as a starting point to implement speech recognition for a voice-activated automatic dental charting system.

139 - Shantanu Mankar

In vitro Evaluation of a New Composite Resin Polishing System

S. Mankar, F. Farheen, J. Burgess, N. Lawson

Objective: To compare the gloss and roughness of two resin composites with 5 different polishers.

Method: Two composite materials (Filtek Supreme, 3M and Tetric Evoceram, Ivoclar) were used to make specimens in silicone molds (6mm dia x 4mm). The composite specimens were finished down to 320 grit SiC paper. The specimens were then hand polished by one operator in 15 second intervals. A speed of 15,000 RPMs with water lubrication was used. Following each interval, the gloss and roughness of the composites were measured. Surface roughness was measured in a non-contact profilometer. Five 4mm lines were measured for each surface and averaged. Gloss measurements were recorded in a gloss meter. Two gloss measurements were made on each sample, each 90 degrees from each other. Data were compared with 1-way ANOVA and Tukey's HSD analysis for each step of polishing and each composite material.

Results: 1-way ANOVA determined that there were differences between polishers' certain steps and composites. The polishers could be grouped into statistically different groups based on Tukey post-hoc analysis. After 90 seconds of polishing on Tetric Evoceram, the first Neoshine polisher showed higher roughness and lower gloss than a brownie or Jazz polisher, and the second Neoshine polisher showed higher roughness than a greenie and similar gloss as a Minnow polisher or greenie. After 90 seconds of polishing on Filtek Supreme, the first Neoshine polisher showed higher roughness and lower gloss than a brownie or Jazz polisher, and the second Neoshine polisher showed similar roughness as a greenie and lower roughness than all other polishers and a higher gloss than all other polishers.

Conclusion: The brownie/greenie system showed the highest gloss and lowest roughness for Tetric Evoceram and the new Neoshine polisher showed the highest gloss and lowest roughness for Filtek Supreme Ultra.

140 - Frederico Lima

Oral Rehabilitation - Occlusion - Problem Solving

F. Lima, K. Kinderknecht

Objective: To present and organized approach to establishing a functional and esthetic outcome for a patient with a severely worn dentition requiring oral rehabilitation.

Method: The implementation of Pankey-Mann philosophy and techniques to problem solve and provide an organized approach for an oral rehabilitation that had begun without adequate planning and problem solving.

Results: The re-establishment of the plane of occlusion using the Broadrick Plane Analyzer and the establishment of the anterior guidance at an acceptable Occlusal Vertical Dimension allows for an esthetic and functional outcome. This is demonstrated in the oral rehabilitation wax-up and the provisional restorations.

Conclusions: The clinical application of established literature-based principles in occlusal treatment planning and problem solving provides an organized approach to oral rehabilitation of a severely worn dentition.

141 - Jonathan Risner

Retrospective Assessment of Pulp Therapy on Young Permanent First Molars

J. Risner, S. Mitchell, J. Jackson

Objective: This study retrospectively evaluated Alabama Medicaid data to assess the outcomes of endodontic procedures completed on young permanent first molars.

Method: Alabama Medicaid claims data for permanent 1st molars receiving indirect pulp therapy (IPT), direct pulp therapy (DPT), root canal therapy (RCT), and apexification (AXN) from 2010-2018 was obtained. Teeth requiring additional pulp treatment or extraction were identified via subsequent CDT codes billed for the same tooth/same patient. If additional treatment was required, overall costs and the length of time from initial treatment was calculated. Data and statistical analyses were completed.

Results: 54,751 unique teeth data sets were obtained with young permanent 1st molars requiring the following pulp treatment: DPT: 5,161; IPT: 27,358; RCT: 22,063; and AXN:169. Additional treatment was required for 15% of DPT, 6% of IPT, 8% of RCT, and 21% of AXN. Extraction was required for 3% of DPT, 1% of IPT, 8% of RCT and 21% of AXN. Teeth receiving RCT averaged 217 days before receiving any crown restoration. Additional treatment was provided over 1294 days for DPT, 1384d for IPT, and 367d for RCT. Average cost of total care of molars requiring additional treatment was \$460 for DPT, \$257 for IPT, and \$364 for RCT.

Conclusions: 1. Most pulp treatment provided for young permanent teeth required no additional treatment. 2. IPT required the least additional treatment. 3. DPT treated molars requiring additional care were expensive and time consuming. 4. RCT required little additional cost or care.

142 - Andrea Pizzini

The influence of Maxillary Sinus Anatomy on Schneiderian Membrane Perforation During Lateral Wall Sinus Augmentation: A 5-year Retrospective Study

A. Pizzini, H. Basma, N. Geurs, R. Abou-Arraj

Objective: Although previous studies have attempted to identify risk factors for membrane perforation, limited information with conflicting data exists regarding the significance of the relationship between lateral wall thickness and membrane perforation. Access to the Schneiderian membrane during the sinus augmentation procedure is obtained through the lateral wall, thus the importance of understanding whether its thickness plays a role in membrane perforations. Residual alveolar bone height seems to also influence the rate of membrane perforation. In addition, the anatomy of the sinus cavity plays an important role in rendering the sinus augmentation procedure straightforward or rather complex. It is theorized that the narrower the sinus cavity, i.e. small LFM angle, the higher the risk of membrane perforation. This retrospective study will evaluate this theory by measuring the angle between the lateral and medial walls of the sinus cavity, which represents the lateral dimension of the cavity (narrow vs. large). In addition, the angle formed between the lateral and medial wall at the most anterior aspect of the sinus, i.e. LAM angle, will be measured and evaluated for association with membrane perforation rates.

Therefore, the aim of this cone-beam computed tomography (CBCT) scan study is to assess the influence of sinus anatomy (as described above) on Schneiderian membrane perforation during lateral window sinus augmentation. A sub-analysis of the influence of factors such as surgeons' level of experience (years in training), residual bone height and span of edentulous site will also be conducted.

If a significant statistical difference (p -value < 0.05) is reached, the null hypothesis will be rejected and the alternative hypothesis (lateral wall thickness, narrow LFM angle, lateral dimension of the sinus, narrow LAM angle and residual bone height affect the chances of membrane perforation during lateral wall sinus lift) will be accepted.

Method: This 5-year retrospective study reviewed available surgical clinical records including treatment notes and preoperative cone beam computed tomography (CBCT) scans of patients that received LWSFE procedures between 2014 and 2019. Treatment notes were evaluated for occurrence of membrane perforations while CBCTs were analyzed for the following anatomical variables: 1) lateral wall thickness at the site of osteotomy (in mm), 2) residual bone height from the floor of the sinus to the alveolar ridge (in mm), 3) angle formed between the lateral and medial walls (LFM angle) at the most apical point on the maxillary sinus floor (in degrees), 4) angle formed between the lateral and medial walls in relation to the anterior wall of the sinus (LAM, in degrees), and 5) distance between the lateral and the medial walls at 5, 10 and 15 (in mm) from the floor of the sinus. Measurement methodology is explained in a supplementary figure. All measurements were made by the same calibrated examiner. The influence of surgical factors such as number of procedures by surgeon, intravenous sedation and type of equipment/instruments was also assessed. Linear and logistic regression models using generalized estimating equations (GEEs) were used to evaluate the associations. A p -value < 0.05 was considered statistically significant in two-tailed statistical tests.

Results: A total 202 patient records from 166 patients (61.45% male, 38.55% female and mean age 64.4 years old) were included after excluding 34 patients for lack of appropriate radiographic or treatment records. Hundred and three procedures were done on upper left quadrant and ninety-nine on upper right. The main descriptive findings were as follows: mean lateral wall thickness of 1.6 ± 0.6 mm, mean residual bone height

of 3.2 ± 1.5 mm, mean LFM angle of 95 ± 10.1 degrees, and mean LAM angle of 75.5 ± 11.0 degrees. The mean distance between the lateral wall and the medial wall at 5(mm) of height from the floor of the sinus was 12.0 ± 2.0 mm, at 10(mm) of height was 15.4 ± 3.1 mm and at 15(mm) of height was 16.4 ± 4.6 mm.

Hundred and twenty six sinuses (62.38%) were clear of pathology (26.24% thickening of the membrane, 5.94% mucous retention cyst, and 4.95 chronic sinusitis). Sinus septa was identified in 20.79% of the sinuses. 34 sinuses presented an artery within the buccal wall (16.83%). Presence of pathology was statistically significant with perforation ($P < 0.013$). The rate of membrane perforation was found to be 25.74% (52/150). Almost one third (29.21%) of LWSFE procedures were performed under intravenous sedation.

A greater thickness of the lateral wall (≥ 1.8 mm) and a narrower LAM angle (≤ 68.2 degrees) were significantly associated with the occurrence of sinus membrane perforations ($P < 0.05$). The influence of a narrower LFM angle on the rate of perforations approached statistical significance ($P = 0.058$). The distance of the lateral and medial wall at 5mm of height from the floor of the sinus of 11.4mm was related to perforation ($P < 0.0032$)

Conclusions: Preliminary findings from this study propose that caution needs to be applied in surgery when thicker lateral walls and narrow anterior angles between the lateral and the medial walls are encountered on CBCT scans to avoid membrane perforations during LWSFE procedures.

143 - Lindsey Rodriguez

A Review of Pediatric Dental Emergencies in a Hospital Setting

L. Rodriguez, J. Jackson, S. Makhija

Objective: The purpose of this study was to analyze the characteristics of patients and dental emergencies evaluated after hours by on-call pediatric dental residents at Children's of Alabama (COA) hospital.

Method: A retrospective review of after-hours emergency patient reports completed by pediatric dental residents at Children's of Alabama was conducted. Data including date of visit, gender, race or ethnicity, age, chief complaint, diagnosis, treatment, and dental home, for each patient was collected and analyzed for the years 2011 to 2015.

Results: One thousand forty patients were evaluated by pediatric dental residents via the Children's of Alabama Emergency Department over the five year period. Six hundred eighty-two (65.6%) of the patients were male and 358 (34.4%) were female. The distribution of race was 47.8% Caucasian, 43.4% African American, 6.2% Hispanic, 1.4% Mixed, 1.0% Asian, and 0.4% Other. Eight hundred sixty-one patients had a chief complaint of dental trauma, whereas 179 of patients had a chief complaint not related to dental trauma, such as facial swelling. Among dental trauma patients, the age distribution ranged from 6 months to 23 years with the average age of trauma being 7.5 years. April and August were the most common months for dental trauma. Forty-six percent of dental trauma occurred at home. In 21.5% of dental trauma cases, no treatment was rendered other than radiographs and an exam. Twenty-five percent of patients presenting with dental trauma reported not having a dental home.

Conclusions: The majority of dental patients presenting to the Children's of Alabama Emergency Department had a chief complaint of dental trauma. Males encountered dental trauma more often than females, and almost half of dental trauma cases occurred at the patient's home. In 78.5% of dental trauma cases, some form of dental treatment in addition to an exam and radiographs was rendered, and at least

one quarter of dental trauma patients did not have a dental home. It is important for dentists to continue to educate patients and parents on preventing dental trauma and efforts should be made to encourage patients to establish a dental home.

144 - Bright Chang

Clinical Management and Treatment Considerations of A 13-Year-Old Amelogenesis Imperfecta Patient: A Case Report

B. Chang, W. Wu

Objective: Amelogenesis imperfecta (AI) is a rare genetic disease affecting amelogenin in 1:700 to 1:14,000 which leads to defects in the quantity, structure, and composition of enamel. Due to the complexity in treatment of AI cases and the multitude of variability in its clinical presentation, treatment depends on the clinical presentation, severity of the disease, type of disease, patient's motivation and cooperation, socioeconomic status, and support from family. This report presents the diagnosis and initial treatment of a 13-year-old Caucasian female patient with AI and discusses the challenges of treatment, clinical management of the patient, key elements of successful treatment in AI patients, phases of treatment, and when multidisciplinary specialists should be involved.

Method: A comprehensive medical, dental, and social examination was completed. Diagnostic records (photographs, alginate impressions, and radiographs) were obtained. Utilizing facebow and CR interocclusal record using Lucia jig technique, diagnostic casts were mounted to evaluate occlusion and restorative space. Phonetics, tooth length, vertical dimension of occlusion, and rest position were evaluated. The comprehensive dental treatment plan this 13-year old patient was to provide bonded restorations to protect tooth structure and build-up anatomy for esthetic, function, self-esteem, and to guide orthodontic treatment. Full mouth diagnostic wax-up based on the patient's age was completed to visualize desired treatment outcome. The provisional prosthodontic management of this patient's conditions was managed utilizing Terry's technique with flowable composite resin. Following orthodontic treatment to move the teeth to their ideal positions, the patient will return to the Prosthodontic clinic for definitive full mouth rehabilitation when the teeth are fully erupted.

Results: Following interim prosthodontic full mouth composite restorations, patient's esthetic smile, phonetics, self-confidence, self-esteem, and quality of life improved. Oral hygiene compliance dramatically increased. The full coverage composite provisional restorations with ideal tooth form allowed the orthodontist to be able to move the teeth adequately.

Conclusions: The key elements to treating AI patients are early diagnosis and intervention and maintenance of good oral hygiene and diet to preserve and protect tooth structure. Treatment should be staged corresponding to the patient's growth development and financial implications for the family. Prosthodontic treatment for AI patients improves the patient's ability to perform oral hygiene, esthetics, chewing functions, and raises the quality of life.

Scholarly Activity

145 - Cody Hughes and William Catanzaro

Rheumatoid Arthritis and the Elderly

C. Hughes, W. Catanzaro, L. Mitchell

Objective: Rheumatoid arthritis is a serious debilitating disease that causes many years of discomfort and pain. Not only is oral health diminished in many individuals, overall health is diminished as well. Rheumatoid arthritis is an autoimmune disorder that causes a long standing battle with joint pain and discomfort due to inflammation via the attack on the body's joint tissues. The mechanism of action behind rheumatoid arthritis involves T cells, B cells, and pro-inflammatory cytokines; with TNF-alpha and IL-6 main cytokines. Some common features and symptoms that may be seen clinically are as follows: polyarthrits of smaller joints typically in the hands and feet, swelling, tenderness of joints, stiffness, whole body fatigue, nodules in the hands, and many more features that produce discomfort. (Davis, 2012) Caries, edentulism, periodontal disease, gingivitis, xerostomia, etc. are commonly seen by the dentist with patients who suffer from rheumatoid arthritis (Yellowitz, 2014). Medications, exercise, a supporting cast, and specific devices can help people who suffer from rheumatoid arthritis live an almost normal and pain free life.

Method: A PubMed search was conducted with the following parameters. Date limits set from 1992 to present. The search was limited to reviews, systematic reviews, meta-analyses, and randomized control trials. MeSH terms searched included "geriatric" or "older adults" and "dentistry and "Health" and "rheumatoid arthritis".

Results: 936 studies met the parameters set. Using best match algorithm, 1 controlled clinical trial and 5 reviews were chosen.

Conclusions: Many older adults suffer from rheumatoid arthritis. Individuals that suffer from this disease can live an almost pain free life by utilizing certain medications, exercise, supporting casts, and an interdisciplinary approach to their care.

146 - Rebecca Pikos

Visual Scheduling for Routine Dental Care for Patients with Autism Spectrum Disorder

R. Pikos, S. Mitchell

Objective: This project intends to assess the dental literature for effective tools for providing dental care for individuals with Autism Spectrum Disorder (ASD) and to develop a tool for implementation at the Sparks Dental Clinic. Direct testing of the tools was prevented by renovations that required the 5m closure Sparks. Therefore, the project was limited to the literature review and tool development.

Method: A PubMed literature review completed with the following search parameters: visual schedule autism dentistry. This information was then used to construct a visual schedule intended to aid ASD individuals to complete a dental cleaning appointment.

Results: Three articles were identified. Limited research exists on how to best provide dental care for patients with ASD. The identified articles show visual schedules/pictorial cue boards can improve cooperation and reduce dental anxiety. Technology such as iPads and mobile apps that can display visual schedules increase compliance and decrease anxiety and may decrease the number and duration of

preventive dental appointments. Information from these articles were used to create a 10-step pictorial cue board and a protocol for implementation. The developed protocol and tools equip parents to prepare their ASD child for the 10 steps of the appointment then repeats these steps during treatment and tracks the patient's progress.

Conclusions: 1. More research is needed on methods for treating patients with ASD. 2. The 10-step visual schedule developed in this project is evidence based and is promising for the treatment of this population. 3. The tools needs to be tested in patient care.

147 - Ivy Watts

Merging Occupational Therapy Practices with Dental Techniques to Improve Oral Health in the Older Adult

I. Watts, L. Mitchell

Objective: America's aging population demands the attention of a multi-disciplinary health approach to oral care. Systemic and debilitating diseases in the older population often influence the maintenance of their dentition. Degeneration of muscle activity and mental disorders may also critically hinder optimal dental health. Thus, an interdisciplinary concept is desirable in combatting the health consequences of aging and improving oral health in the older adult.

Method: A PubMed search was conducted utilizing the following parameters. The search was limited to the date range from 2000 to present and included clinical trials, meta-analyses, randomized controlled trials, and systematic reviews. MeSH terms included were "elderly" and "oral hygiene" and "occupational therapy".

Results: 32 studies met the guidelines set. Utilizing best match algorithm, 3 reviews and 6 randomized controlled trials were chosen.

Conclusions: Health professionals have a responsibility to adapt to America's increasing older population. Incorporating occupational therapy practices will benefit oral health and quality of life in the geriatric population, with the most significant improvements in those with cognitive impairment.

148 - Keaton Hughes and Anna Marie Ronderos

Post Systems: A Literature Review

K. Hughes, **A. Ronderos** , **M. Seidenfaden**, Robles A.

Objective: The aim of this study was to review prospective and retrospective clinical studies focused on cast metal or fiber post-and-core restorations in permanent teeth, limited to adult humans, in order to investigate the failure modalities and rates of restoration survival.

Method: Electronic searches were performed on the PubMed database by crossing key words: "fiber post and clinical study", "fiber post and clinical evaluation", "cast post-and-core and clinical study", and "root post and retrospective survival study". The search included dates from January 1st, 2011 through December 31st, 2019. Selection of the studies was based on specific inclusion and exclusion criteria. The studies that met these criteria were then reviewed for data extraction. Out of 572 studies, 21 met the inclusion criteria.

Results: Several findings came from the thorough data extraction of 9 retrospective and 12 prospective studies. Evaluation of several different post systems was performed comparing failure modalities and success rates. Failure modalities proved to be different for each type of post system, while success rates tend to vary. Several studies concluded that posterior teeth receiving post-and-core restorations showed higher success rates than those in anterior teeth. While glass-fiber post systems had similar survival rates as the cast-metal post systems, the failure modalities were quite different. Most failures associated with glass-fiber posts were reversible including un-bonding of the post and secondary caries, while the failures associated with cast-metal posts showed irreversible effects such as root fracture. The majority of the studies came to the same conclusion that the most important factor in success for post-and-core restorations was the amount of remaining tooth structure. Failures that occurred at similar rates included endodontic and periapical failures.

Conclusions: Of the 21 studies included, five studies researched both cast-metal and glass-fiber posts. Therefore, there was no clear survival rate difference between cast metal posts and glass-fiber reinforced posts. Although, it is noted that the failures associated with glass-fiber reinforced posts have a higher likelihood of being reversible, when compared to the failures associated with cast-metal posts. In the remaining 16 studies, success of the glass-fiber posts depends on the number of cavity walls, height of ferrule (2mm), anterior or posterior teeth.

149 - David Cordaro

A Vicious Cycle: How Oral Health, Nutrition, Systemic Health, Psychosocial Factors, and Socioeconomic Status Interplay with Each Other to Establish Overall Health-Related Quality of Life in the Geriatric Population

D. Cordaro, L. Mitchell

Objective: The geriatric patient population has a less than optimal overall health-related quality of life in comparison to the remainder of the U.S. patient population at large. On average, the geriatric patient population's oral health status is a significant contributing factor to this problem that is often overlooked by healthcare providers outside of the dental profession. Older adults who are 65 or older are estimated to comprise slightly less than 25% of the United States population by 2060, which means that the healthcare community should not neglect these findings. Untreated periodontal disease, which eventually leads to tooth loss, is prevalent among the older adult population – it affects 68% of the geriatric patient population.

This literature review will evaluate several factors that affect overall health-related quality of life, with a particular emphasis on oral health status. Poor oral health leading to partial or complete edentulism (tooth loss) is arguably the leading contributor to poor systemic health, as it has a direct correlation to malnutrition, psychosocial factors, and depression. Socioeconomic status and transportation issues are the main factors that limit the geriatric population's access to comprehensive dental care. Mandibular implant overdentures are an excellent solution to improving edentulous patients' overall health-related quality of life, as they improve patients' ability to maintain proper nutrition, and also have the potential to alleviate psychosocial problems and depression.

Method: A PubMed search was completed with the following guidelines. The date limits were set from 1990 to present. The search was comprised of randomized controlled trials, reviews, non-systematic reviews, and meta-analyses.

Results: 3 reviews, 1 nonsystematic review, 2 randomized controlled trials, and 1 meta-analysis of randomized-controlled trials met the search criteria.

Conclusions: Poor oral health is prevalent in the geriatric population and should not be ignored, as it has direct links to malnutrition, poor systemic health, and can lead to depression with the onset of edentulism.

150 - Forrest Harris and Matt Wall

A Review on Diet and Oral Health of Centenarians

F. Harris, M. Wall, L. Mitchell

Objective: Centenarians, or individuals that live to at least 100 years of age, are often subjects of various studies in an attempt to uncover how they have managed to delay the inevitability of death. Analysis of centenarians around the world has revealed a number of communities and cultures which seem to continually produce these age-defying individuals. Modifiable factors such as diet, exercise, and sociality seem to play a significant role in reaching such a milestone age, but the influence of mere genetics cannot be ignored as, at minimum, a contributory factor.

Method: PubMed was used to select resource material within the given limits that follow. Literature material in the search was set to include reviews, cross-sectional studies, reports, case series, editorials, systematic reviews, and meta-analyses with a literature publish date from 2003 to present. The recorded MeSH terms used include “centenarian” and “diet” and “oral health”.

Results: 457 results were obtained within the above outlined search limits and sorted by best relevance or match. The chosen literature includes 3 reviews, 3 cross-sectional studies, 2 expert consensus reports, 1 case series, and 1 editorial.

Conclusions: Evidence shows that centenarians likely benefit from a combination of predetermined genetics and modifiable lifestyle factors. Genetically, there are recorded commonalities among the up and down regulation of certain genes in many centenarians. In regards to lifestyle, diets common in centenarian-producing communities have shown correlation with markedly lower incidences of cardiovascular disease and cancer. Although the exact formula of becoming a centenarian is still unknown, it is likely that this group will continue to receive considerable attention as average lifespans progressively increase.

151 - Kai Huang and Emily Roig

A Review of Orofacial Pain Assessment in the Cognitively Impaired Geriatric Patient

K. Huang, E. Roig, L. Mitchell

Objective: The growing geriatric population with retained dentitions coupled with the current rates of cognitive impairment among older individuals is a cause of concern for the dental practitioner and their ability to accurately assess orofacial pain. Typically, the dental practitioner is alerted to orofacial pain through self-report by the patient. However, addressing orofacial pain can pose a challenge in patients with cognitive impairments who are non-verbal and unable to accurately report their pain. This review aims to summarize current methods and procedures used to assess orofacial pain in the cognitively impaired patient by dental professionals.

Method: A PubMed search was conducted with the following parameters. Date limits set from 1995 to present. The search was limited to reviews, systematic reviews, meta-analyses, comparative studies,

controlled clinical trials and randomized trials. MeSH terms searched included “facial pain” and “cognition disorders” and “pain measurement”.

Results: 7 studies met the parameters set. Using best match algorithm, one comparative study and one controlled clinical trial were chosen.

Conclusions: There exists minimal information available in the literature on methods for assessing orofacial pain in the cognitively impaired population. However, findings indicate that facial expressions can be a useful tool to assess orofacial pain in non-verbal patients.

152 - Elizabeth Pickering and Claire Walker

A Review of the Etiology, Prevalence, Symptoms and Diagnosis, and Treatment Options of Sleep Apnea

E. Pickering, C. Walker, L. Mitchell

Objective: With the average life expectancy steadily increasing, the geriatric age range is the fastest growing population in the world. This has sparked research in how to afford increased healthcare expenses for the growing geriatric population for an increased amount of time. Sleep apnea syndrome is a prevalent sleeping disorder among the geriatric population with ties to increased morbidity and mortality, as age is cited as a non-modifiable risk factor in developing sleep apnea syndrome. The American Academy of Sleep Medicine reveals that correctly identifying, diagnosing, and treating sleep apnea could help reduce healthcare costs and result in approximately \$100 billion in yearly economic savings.

Method: A PubMed search was conducted with the following parameters. Date limits set from 1992 to present. The search was limited to reviews, systematic reviews, meta-analyses, and randomized control trials. MeSH terms searched included “elderly” and “sleep” and “apnea”.

Results: 165 studies met the parameters set. Using best match algorithm, 6 reviews, 1 randomized control trial, 1 systematic reviews, and 3 meta-analysis were chosen.

Conclusions: The continual research and study of sleep apnea syndrome in the geriatric population poses its relevance as the average lifespan continues to increase and as researchers explore means by which to lower healthcare expenses for older adults who are living longer. While significant research has been conducted relating to the cause of sleep apnea, more reliable research needs to be conducted on the prevalence of the syndrome among the geriatric population in hopes to expose a means of decreasing healthcare costs among a geriatric population of increasing longevity.

153 - Morgan Abraham and Danielle Ho

Acupuncture and Electrostimulation: Non-Pharmacological Solutions for Xerostomia

M. Abraham, D. Ho, L. Mitchell

Objective: Xerostomia, the subjective sensation of dry mouth, is an oral condition that plagues much of the population, especially adults over the age of 65. Due to increased life expectancy and the high prevalence of medicated therapies and polypharmacy, xerostomia will continue to escalate and become a critical issue that should be addressed. This review evaluates the effectiveness, both qualitatively and quantitatively, of two non-pharmacological therapies for xerostomia: electrostimulation and acupuncture.

Method: Research studies pertaining to electrostimulation and acupuncture therapy were evaluated. “Xerostomia”, “geriatric”, “electrostimulation”, and “acupuncture” were the key words used to generate the database of information in PubMed. The selection of studies was conducted separately by two researchers. The search yielded 31,597 articles according to the aforementioned search criteria. Articles were screened based on relevant information and restricted to years 2007 to 2019. Studies with a specific goal of testing the effects of electrostimulation and/or acupuncture therapy in human patients above 65 were solely utilized. Studies with a low subject pool or irrational methods were eliminated. Ultimately, 16 evidence-based articles were generated for this review.

Results: Both electrostimulation and acupuncture therapy have both demonstrated statistically significant results in managing xerostomia in geriatric patients.

Conclusions: The studies reviewed clearly demonstrated the effectiveness of electrostimulation and acupuncture therapy in the treatment of xerostomia and presented a promising treatment option for xerostomic patients in the future. Additional research is indicated in order to become a standard treatment option for these patients.

154 - Makayla Nixon and Ashley Weaver

Ameloblastoma: Current Treatment Methods and Management

M. Nixon, A. Weaver, S. Coble

Objective: Ameloblastomas are benign odontogenic tumors that are most commonly located in the posterior mandible. Clinical presentation includes a slow-growing, asymptomatic mass with expansion of the bone. Ameloblastomas are described based upon their clinical and radiographic appearance and classified as either multicystic, unicystic, or peripheral. The effectiveness of different treatment methods are dependent on the characteristics of the tumor and its response to treatment.

Method: A review of the literature was conducted to compare recurrence rates of ameloblastomas in response to different treatment methods. The parameters of our search included peer reviewed articles including case studies, cross-sectional studies, randomized control trials, and systematic reviews. Data included patient demographics, clinical and radiographic appearance, recurrence rates, and treatment methods.

Results: Treatment of ameloblastoma can be both surgical and non-surgical. Patients treated with simple excision, such as enucleation, curettage, and cryotherapy, had higher recurrence rates (41%). Alternatively, patients treated with surgical excision coupled with a safety margin of 1-2 cm had low (11%) to no recurrence of the tumor. Non-surgical approaches, including radiation and chemotherapy, are typically used for metastatic and/or large tumors. Multicystic ameloblastomas have higher recurrence rates (39-60%) when compared to unicystic ameloblastomas (14%).

Conclusions: Ameloblastomas can recur when inadequate treatment is performed. Therefore, treatment options must reflect both the characteristics of the tumor and the patient in order to properly manage the ameloblastoma.

155 - Meg Eason and Keira Yang

Animal Assisted Therapy in the Older Population

M. Eason, K. Yang, L. Mitchell

Objective: Animal assisted therapy (AAT) is a form of treatment that utilizes animals in aiding with the improvement of physical, mental, and emotional well-being of many patients. The geriatric population is a demographic of our society that is especially prone to these problems. Usage of AAT has been shown to improve the quality of life in the elderly in these areas of health. Some of the data has shown AAT can help reduce blood pressure, depression, and ease symptoms of dementia.

Method: A PubMed search utilizing the best match algorithm was conducted in order to find literature that fit certain criteria. Articles were limited to those published within the last 10 years. The search was limited to systematic reviews, reviews, clinical trials, and randomized clinical trials. MeSh terms that were used in this search included, "Animals Assisted Therapy," "Aged," "Depression," and "Dementia."

Results: 30 studies fit the criteria of the search. One systematic review was chosen, as well as 3 reviews, 4 randomized controlled trials, and 1 clinical trial.

Conclusions: Animal assisted therapy is an effective practice in order to assist in the treatment of common illnesses in the older population, including depression, loneliness, dementia, and hypertension. Considering the numerous benefits of AAT, it is a practice that should be used often in the care of older adults as an alternative to traditional pharmacological methods.

156 - Nia Taylor and Raymond Dawkins

Barriers to Oral Health Care in the Alabama Older Adult; Results of the ASTDD Surveys

N. Taylor, R. Dawkins, L. Mitchell

Objective: Introduction: The population is aging and there are older adults in Alabama who do not receive regular oral care to contribute to their overall health. Many older adults describe various reasons that they do not seek dental care. This project defines some of those reasons and gives insight into how to help this problem in the older adults in Alabama.

Objective: To present information from the surveys completed by the older adults during the UAB SOD Geriatric Outreach Rotation programs, 2016-2019.

Method: Data was obtained from surveys completed by the older adults who participated in the Geriatric Outreach Rotation, 2016-2019. The surveys were based on an ASTDD validated instrument. (Association of State and Territorial Dental Directors)

Results: The older adults surveyed in Alabama most frequently listed barriers to oral care as being cost, fear, and lack of transportation. This gives dental professionals insight into what is needed to improve the oral health of the older adults in Alabama and a challenge to help this neglected population to obtain the care they need.

Conclusions: The older adults surveyed in Alabama most frequently listed barriers to oral care as being cost, fear, and lack of transportation. This gives dental professionals insight into what is needed to improve the

oral health of the older adults in Alabama and a challenge to help this neglected population to obtain the care they need.

157 - Rachelle Cucca and Skyler Williams

Comparison of Dentoalveolar Complications in Adult and Geriatric Populations

R. Cucca, S. Williams, E. Bradford

Objective: Complications are an inherent part of oral and maxillofacial surgery. The most common complications can be a result of the delivery of local anesthesia, can include disturbed wound healing, damage to other oral structures, nerve damage, bleeding, and infection. The purpose of this literature review was to identify the most common intraoperative and postoperative complications reported in the literature and compare this to complications that commonly arise in similar procedures in the geriatric population.

Method: A PubMed literature search was conducted according to the following parameters: Date limits were set from 2010 to present. Search results were limited to systematic reviews meta-analyses, and randomized controlled trials. MeSH terms included were “dentoalveolar” and “tooth extraction” and “complications” or “adverse effects” and “older” or “geriatric” and “extraction” and “complications” and “older” or “geriatric”. A second expanded search added clinical trials, books and documents, and other reviews to the search criteria.

Results: The initial search yielded no randomized controlled trials, no meta-analysis’s, and no systematic reviews that fit the inclusion criteria. The search was expanded to include all types of studies and reviews.

Conclusions: The most common intraoperative complications associated with minor dentoalveolar procedures for the normal adult populations included IAN injury, lingual nerve injury, unexpected hemorrhage, airway compromise, aspiration of tooth fragments, and oral/antral/nasal fistulas. The most common post-operative complications included alveolar osteitis, infection, IAN injury, facial nerve injury and unplanned additional surgeries. The severity and extent of complications were both increased in the geriatric population. Complications in the geriatric population seemed to be heavily depended on pre-operative health status and the patient’s presenting medical conditions.

158 - Austin Davis and Alex Hale

Computer Aided Design and Fabrication of Removable Partial Denture Frameworks

A. Davis, A. Hale, M. Kim

Objective: Rapid Prototyping (RP) is a process capable of fabricating very precise metal objects and can be used in dentistry to create fixed and removable prostheses with the aid of computer aided design (CAD). RP technology is currently being used to fabricate many fixed prostheses and is yielding favorable results. However, many removable partial denture (RPD) frameworks fabricated today are still made using traditional techniques. This review will explore the processes of digitally designing and fabricating RPD frameworks and explain their pros and cons.

Method: PubMed was utilized to gather research literature regarding the use of computers in designing and fabricating removable partial dentures. Using all fields and the keywords “removable partial denture,” 7,809 results were found. Results were narrowed to 27 by adding the key word “printed” to the all fields search.

An additional search using the MeSH terms “denture, removable partial” and “cad cam” yielded 117 results. A separate search using the MeSH term “denture, removable partial” paired with the all fields keywords “selective laser melting” yielded 15 results, while the MeSH term “denture, removable partial” with the all fields keywords “selective laser sintering” yielded 3 results. After these searches were complete, 13 articles fulfilled our research criteria and were selected for review.

Results: The literature shows that RP fabrication of RPD frameworks yields clinically acceptable results. However, there are inconclusive results about which methods provide superior fit, accuracy and strength.

Conclusions: The use of RP technology is an easier and more efficient way of producing RPD frameworks. However, there is not enough research to conclude that RP technology is capable of fabricating a superior RPD framework compared to traditional techniques. The high cost of the machinery and software used to fabricate RP RPD frameworks may keep this method of production unpopular for the time being.

159 - Lauren Cabaniss and Michael Hanley

Dementia and Diabetes

L. Cabaniss, M. Hanley, E. Sides

Objective: Alzheimer’s disease and other forms of dementia are typically associated with aging, but evidence exists to suggest that insulin resistance, such as that found with Type 2 Diabetes, also plays a role in the development of dementia.

Method: A systematic review of the literature was undertaken to assess the evidence linking insulin resistance to forms of dementia including Alzheimer’s disease. Relevant articles were identified through searches in PubMed, Google Scholar, and through reviewing the bibliographies of relevant articles. Studies were included in the analysis if they measured cognitive function in diabetics at the beginning and at follow-up.

Results: The literature shows that people with diabetes have an increased risk of developing dementia or having cognitive decline when compared to people without diabetes.

Conclusions: People with diabetes have an increased risk of dementia when compared to non-diabetics. While this adds to the long list of complications associated with diabetes, identifying the association between the two diseases can lead to novel treatment approaches.

160 - Mackenzie Kidd and Olivia Sorrell

Dental Management of Opioid Abuse in the Older Adult

M. Kidd, O. Sorrell, L. Mitchell

Objective: This review aims to discuss the presence and severity of opioid abuse among geriatric patients as well as discuss treatment management considerations providers can adopt in order to help alleviate this epidemic.

Method: A search was conducted on PubMed to evaluate articles regarding the epidemiology, morbidity, and mortality associated with opioid abuse in older adult populations in rural, independent, and nursing home settings. 8 articles and 2 websites were selected to be reviewed.

Results: After review of the articles, providers must first be aware that there is a potential for abuse of opioids in older adults, whether intentional or accidental. Second, providers should know what opioids should be avoided due to physiological changes associated with aging. Third, the appropriate dosing for an older patient should consider the other medications a patient is currently taking as well as their renal and hepatic function. Last, providers should consider establishing practices or volunteering part-time in rural communities to alleviate the burden geographic barriers pose to proper medical treatment of older adults.

Conclusions: This review aimed to bring light to the issue of opioid abuse and misuse among geriatric patients as well as to address how providers should handle prescribing opioids in geriatric patients. By understanding the circumstances unique to the geriatric population, the network of providers taking care of geriatric patients can provide better and safer care.

161 - Martin Bryant and Brandon Veach

Depressed or Isolated: A Perspective On the Deteriorating Mental Health of the Geriatric Population

M. Bryant, B. Veach, L. Mitchell

Objective: Introduction: The study of geriatrics is of utmost importance in today's society for enhancing the quality of life for our older generations. By 2050, the percentage of people aged sixty-five years and older will be at an all-time high of 20 percent. If healthcare professionals can begin to understand and improve the treatment of diseases and syndromes affecting the older adult, this large percentage of the population will live much healthier and longer lives. One of the most common conditions affecting the older adult is depression. Approximately sixteen million people in the United States suffer from depression each year. Within this sixteen million, seven million are adults sixty-five years of age and older. Depression is a clinical syndrome that can cause serious debilitation to a person's life. Features of depression include an overall feeling of emptiness that can lead to anxiety, extreme fatigue, loss of interest in physical and social activities, insomnia, and several more. As the population of older adults continues to increase, healthcare professionals must learn to identify the causes of late life depression and continue to find new and effective ways to manage this debilitating syndrome.

Method: Material and Methods: A PubMed search was performed with the following parameters. Date limits set from 2005 to present. The search was limited to reviews and systematic reviews. MeSH terms searched included "geriatric" or "older adult" and "depressive disorder."

Results: Results: 457 studies met the parameters set. 7 reviews were chosen.

Conclusions: Conclusion: Depression is a debilitating syndrome that affects millions of people of all ages. As the percentage of the older adult population continues to increase, more and more people will be at risk for depression. Therefore, it is important to understand the risk factors for depression and what can be done to effectively manage the syndrome. Whether the cause be from stressful life events, social and physical inactivity, changes in cognitive ability, or side effects of certain medications, healthcare professionals must be able to effectively manage and treat depression with means such as pharmacological management, psychosocial therapy, social engagement, and physical activity. With serious attention and effort, many of those affected will be able to live purposeful lives without the burden of depression weighing them down.

162 - Zachary Carter and Marshall Hartzog

Etiology and Treatments of Xerostomia Associated with Geriatric Populations

Z. Carter, M. Hartzog, L. Mitchell

Objective: This research project aims to review the process of xerostomia, as well as some of its etiologic factors, effects, and treatment options

Method: A review of literature pertaining to Xerostomia and geriatrics.

Results: Xerostomia is the subjective perception of a dry oral cavity. Contrary to common belief, salivary function largely remains intact during healthy aging. One of the most common medical diseases associated with Xerostomia is Sjogren's Syndrome. Polypharmacy can also lead to the development of Xerostomia. Treatment options include artificial saliva, cholinergic drug therapy, immunosuppressant drug therapy, and lifestyle changes.

Conclusions: It is vital to understand the etiology and management of Xerostomia because of its impact on overall quality of life and oral health. It is important to understand the management options that are available to improve patient health. Providing an improved quality of life by restoring the ability to enjoy a varied diet and protect the oral cavity will continue to be an issue of vital importance as the population ages.

163 - Victor Warren and Timothy Kreger

Factors Associated With Low and High Article Citations in the Oral and Maxillofacial Surgery Literature

V. Warren, T. Kreger, K. Borie, K. Martin, C. Boyd

Objective: We assessed the factors in reported oral and maxillofacial surgery (OMS) studies associated with the number of citations.

Method: We identified all primary research studies reported from 1998 to 2008 in the International Journal of Oral and Maxillofacial Surgery, Journal of Oral Maxillofacial Surgery (JOMS), British Journal of Oral Maxillofacial Surgery (BJOMS), and Journal of Craniomaxillofacial Surgery. Of the identified studies, 66 had obtained only 0 to 3 citations in the 10 years after publication. We compared these lowest cited reports with the 66 highest cited reports. The characteristics of the lowest and highest cited studies were compared using bivariate analysis. Logistic regression analysis using generalized estimating equations was conducted to examine the association between the selected article-, author-, and

journal-level characteristics and high citations.

Results: On the initial bivariate analysis, highly cited studies were associated with greater abstract and manuscript word counts ($P < .0001$), manuscript pages ($P < .0001$), figures ($P = .0482$), sample sizes ($P = .0149$), and references ($P < .0001$). They were also more likely to have reported a significant result ($P = .0202$), been published in JOMS ($P = .0405$), and covered topics such as dentoalveolar/implantology and trauma/reconstruction ($P = .0002$). Lowly cited articles were more likely to have been published in BJOMS ($P = .0405$) and addressed topics unrelated to core OMS procedures ($P = .0002$). The H-indexes of the first and corresponding authors were greater in the high-citation group ($P < .0001$). After multivariate analysis, a greater number of manuscript pages ($P = .0015$) and classification as dentoalveolar/implantology ($P = .0017$) or trauma/reconstruction ($P = .0368$) had greater odds of high citations. In addition, a higher H-index for the first author made it more likely to be in the high-citation group ($P = .0397$).

Conclusions: Relatively few studies in the OMS literature failed to produce citations in the 10 years after publication, indicating that most studies accepted for publication provide meaningful contributions. Significant differences were found between the highest and lowest cited publications, suggesting that study design and article structure might influence the articles' audience and effect.

164 - Will Mahone and Daniel Kuyk

Frailty Syndrome in the Older Adult Population

W. Mahone, D. Kuyk, L. Mitchell

Objective: Frailty syndrome is among the most discussed topics in the field of geriatric health care. The concept of frailty syndrome and its relevance to the health of the elderly population has amassed significant attention in the research and medical communities. Frailty syndrome is generally described by geriatricians and researchers as a loss of physiologic reserve and homeostasis secondary to aging. As the average lifespan continues to increase, and the world's population continues to age, it exhibits higher incidences of frailty syndrome. As a result, numerous recent efforts have been made to further understand this condition's etiology, recognize its association with other geriatric conditions, and propose potential therapeutic goals aimed at mitigation of the syndrome. A brief overview of the current literature and understanding of the syndrome—including the definition, pathophysiology, applications, and potential therapy—will be provided.

Method: A thorough search through PubMed via Lister Hill Library at UAB was conducted with the following parameters. Date limits were set from 1994 to present. Sources were limited to meta-analyses, randomized controlled trials, reviews, and systematic reviews. MeSH terms searched included "geriatrics" or "geriatric medicine" and "frailty syndrome".

Results: 540 studies met the parameters set. Using the best match algorithm, 5 reviews, 5 randomized controlled studies, and 1 meta-analysis were chosen.

Conclusions: As previously stated, frailty is an important topic in the field of geriatrics, and it is becoming increasingly common as the world ages. While frailty is understood more thoroughly today than ever, more research is still needed—particularly as it pertains to potential interventions. Ideally, research outlined above and all future endeavors will lead to a positive shift in how frailty is recognized and managed.

165 - Paige Holbrook and Cory Satterfield

Gingival Mask: A Case Report and Literature Review

P. Holbrook, C. Satterfield, R. Chavali

Objective: Gingival recession is a common dental concern, occurring in 50% of US adults under 65 and 88% of US adults 65 and over. Its sequelae include hypersensitivity, increased risk for root caries, and esthetic and functional complaints. Recession can be treated by surgical and non-surgical methods, including restorations, root conditioning and surgical root coverage, or construction of a gingival mask when surgical procedures are not appropriate. Gingival masks can replace large areas of deficient tissue, such as the gingival sulcus, interdental papilla, and ridge form. Material options include silicone, acrylic, composite resin, or ceramic. Gingival prostheses are contraindicated in patients who are heavy smokers or have poor plaque control, unstable periodontal conditions, high caries risk, or allergies to the materials used in the mask. This poster details a case report of a 74 year old white female desiring a prosthetic esthetic option for replacing gingival tissue.

Method: A flexible silicone gingival mask was fabricated. Records were made using a 2-step impression technique. Splash putty was used to capture the facial aspect, incisal edges, maxillary vestibule, and interdental triangles of the maxillary teeth. An alginate impression was taken of the palatal aspect of the teeth, and indexed with the putty impression. A shade was matched to the patient's tissues. The impression was poured with silky rock. The gingival mask was waxed up and processed in the UAB dental lab: Pink wax was used to fill and cover the interdental spaces and root surfaces of the teeth to give an ideal gingival contour. Surface characterization was added. Gingivamoll OPAQUE was placed in the interdental spaces and Gingivamoll PINK was pressed onto the remaining areas of the mask. Retention was added to the prosthetic in the interdental triangles by expanding the silicone materials to create plugs and by engaging the distal of the most posterior teeth in the arch. The mask was processed at 70 psi for 10 minutes, then polymerized in a dry air oven at 150 degrees Celcius for 45 minutes. At delivery, esthetics and function were evaluated, taking care to evaluate the patient both at rest and during speaking, chewing, and swallowing.

Results: Gingival defects can be treated by surgical or prosthetic approaches. Surgical approaches with soft tissue grafting are indicated with mild recession, but are unpredictable in cases of advanced bone loss, such as Miller class III - IV defects. Removable or fixed prosthetic replacement of gingival tissue is more predictable in cases of advanced hard and soft tissue loss, and offer a less invasive treatment option than surgical correction. Removable prosthetics are cleansible, can replace large volumes of tissue, and can easily be manipulated and adjusted over time to give optimum esthetics. Fixed prosthetics offer better retention during function and are more stable, but are less cleansible and harder to adjust as tissues change over time. The decision to use a removable or fixed prosthetic to replace gingival tissue depends on the amount of tissue lost, patient function, smile analysis, and patient goals and expectations.

Conclusions: As dentists, it is important to keep our patient's overall goals in mind. Esthetics is as essential to patient care as creating a healthy oral environment. An understanding of prosthetic solutions for gingival replacement is essential for comprehensive patient care, as well as the indications and limitations of these treatment options. The custom gingival mask provides a predictable esthetic replacement option for patients who have undergone periodontal resective therapy.

166 - Patrick Bryant

Healing Time Following Aesthetic Crown Lengthening

P. Bryant, A. Pikos, M. Kim

Objective: Aesthetic crown lengthening is a common procedure often utilized to achieve aesthetic prosthodontic proportions while respecting the Dentogingival junction in the preservation of biological width. While aesthetic crown lengthening is a common procedure, there is debate as to the amount of time required between surgery and prosthetic restoration. Some authors recommend 6 months healing period as changes in the Dentogingival junction have been shown to be detectable, however, others suggest that 8-12 weeks if certain parameters are met. This review will explore the minimum acceptable healing period required for prosthetic restoration following aesthetic crown lengthening procedures.

Method: PubMed was used to gather pertinent literature regarding parameters for aesthetic crown lengthening procedures and subsequent prosthetic treatment. Utilizing the all fields function and keywords "aesthetic crown lengthening" 398 results were found. Results were then narrowed to 55 articles when the keywords "biologic width" were added to the all fields search. Results were further narrowed to 37 results with the addition of MeSH term "crown lengthening." A separate search using all fields function and

keywords “crown lengthening” and “healing time” yielded 12 results. 8 articles were selected for this review.

Results: The literature supports that the minimum healing period following crown lengthening and preceding prosthodontic restorations is 8 weeks given the time required for the reestablishment of a stable Dentogingival junction. While osseous recontouring may occur over more than 12 months, the soft tissue should be matured in 8 weeks allowing restorative space for placement of final restorations.

Conclusions: The implementation of aesthetic crown lengthening can be an integral part of restoring anterior teeth with proportional harmony. The aim of this review was to determine the earliest acceptable healing time required prior to the final restoration in treatments involving aesthetic crown lengthening. The literature suggests that restorative preparations may be placed as early as 8 weeks post surgically, however the issue of coronal migration may ensue over the course of 6 months, and the osseous remodeling may stabilize more than 12 months post surgically.

167 - Joseph Newman and Casey Williams

Hyponatremia in Older Adults and Risk of Fracture

J. Newman, C. Williams, L. Mitchell

Objective: Hyponatremia is a condition that occurs when sodium levels in the blood are abnormally low. It is the most common electrolyte imbalance seen in older adults and has been studied as a potential risk factor for bone fractures in these older populations. The objective of this literature review was to evaluate the clinical circumstances that may contribute to developing hyponatremia in geriatric populations, the contribution that hyponatremia has on the risk of bone fracture and other body systems, and how knowledge of hyponatremia and its associations with health outcomes in older adults can enable providers to manage patients with this condition.

Method: A PubMed literature search was conducted according to the following parameters: Date limits set from 2000 to present. Search results limited to reviews, meta-analyses, and randomized controlled trials. MeSH terms “hyponatremia” and “geriatric” or “older” and “fracture” with subheadings “diagnosis” and “etiology” and “pathology” and “prevention and control” and “statistics and numerical data” and “therapy” were included in the search.

Results: The search resulted in 59 studies that met the inclusion criteria. Six studies, two reviews, and one systematic review and meta-analysis were selected.

Conclusions: Hyponatremia is associated with an increased risk of falls and bone fractures. Older adults have a higher risk of developing hyponatremia, and thus hyponatremia should be considered a risk factor for falls and fractures in this population. If health providers recognize sequelae associated with hyponatremia, then appropriate interventions can be prescribed and the quality of life of geriatric populations can be improved.

168 - Sarah Prine and Kyle Penland

Impact of Driving Cessation on the Older Adult Population

K. Penland, S. Prine, L. Mitchell

Objective: Driving cessation impacts older adults each year. With it, comes new and troublesome consequences including a decline in happiness, poorer general health, and a greater risk of mortality.

Further, it becomes increasingly difficult for these individuals to make their medical appointments as they must find reliable transportation, which can be a tremendous burden. Emotionally, older adults that lose their license are two times more likely to become depressed.

Method: A PubMed search was conducted with the following parameters. Date limits set from 1993 to present. The search was limited to reviews, systematic reviews, meta-analyses, and randomized control trials. MeSH terms searched included “geriatric” or “elderly” and “health” and “driving” and “cessation”. A census search was conducted for demographic information in Jan 2020.

Results: 56 studies met the parameters set. Using best match algorithm, 8 reviews, 1 systematic reviews, and 1 meta-analysis were chosen.

Conclusions: Older adults are highly impacted by the loss of driving privileges. Problems with emotional and mental health, social engagement and physical health are the most reported and affect the quality of life of the older adult.

169 - Viviana Sepulveda and Abena Lamptey

Impact of Edentulism on Oral Health and Nutrition for the Older Adult

V. Sepulveda, A. Lamptey, L. Mitchell

Objective: The objective is to describe the impact lack of natural teeth has on the nutrition of the older adult population and ways healthcare professionals can recognize nutritional deficiency and ensure patients continued use of well-fitting dentures.

Method: A PubMed search was conducted under the following parameters. Sources are limited to comparative studies, case reports, cross-sectional studies, and prospective cohort studies. All articles are peer reviewed and published from 2011 to 2018. MeSH terms included “edentulism” and “nutritional deficiency” and “elderly” and “oral health” and “dentures”.

Results: The older adult population is most affected by edentulism, with a higher rate seen in minority groups. Approximately 25% of 40.3 million older adults have no natural teeth remaining. Tooth loss results in physical changes that can greatly impact the chewing force and masticatory efficiency. Furthermore, polypharmacy is a common occurrence among the older adult population. As Americans are living longer, they are more susceptible to chronic health conditions requiring different types of medications. Multiple medication use has been shown to reduce salivary flow. The need for longer chewing time with the use of dentures, disuse of dentures, and lack of taste from reduction in salivary flow all lead the older adult to modify their food selection to softer and high caloric foods.

Conclusions: Possessing a natural dentition contributes to the overall well-being and quality of life for the older adult. It is essential to note the different factors that affect the older adult’s quality of nutrition and oral function. Because Americans are living longer, oral health care for the aging population becomes even more important. As highlighted by several studies done on nutritional quality of the edentate older adult, it is imperative for dentists to provide continued yearly oral exams to ensure proper fitting dentures, and to refer patients to a nutritionist when oral signs of nutritional deficiency are present. Recognizing oral signs of malnutrition and social isolation associated with a lack of adequate dentition is crucial in order to help our older adult patients live a healthy and happy life.

170 - Kaitlin Byerly and Brielle Daverede

Impact of Intergenerational Programs

K. Byerly, B. Daverede, L. Mitchell

Objective: Intergenerational programs may be one way of reducing senior citizens' negative interactions with the medical field and may improve their overall health and well-being. This can be done in a variety of ways (through both preventative and therapeutic care), but one way that may seem simple is often overlooked. Definitive and concrete personal relationships and human interactions are simple interventions that can have positive, lasting impacts on the health and well-being of geriatric patients. As many older adults often feel isolated and alone (which contributes to negative health effects), one solution to this problem is to introduce intergenerational programs into the equation.

Method: A PubMed search was utilized with the following parameters. Publication data limits were set from 2010 to present day. The search was limited to peer reviewed journals. MeSH terms included in the search were "intergenerational relations".

Results: 27 studies met the parameters that were set in the PubMed search. Utilizing the best match algorithm, 6 articles were chosen.

Conclusions: The reduction of social isolation and loneliness among participants in intergenerational programs can lead to long term improvements in their health and sense of meaningfulness. While all of these studies point to high and positive notes, more research in this area is necessary to determine all of the positive, and possibly, if any, negative, effects of intergenerational programs. With further study and a greater number of research participants, more specific benefits and impacts of these programs should be realized. If current research conclusions are correct, though, the future should reaffirm the positive and powerful benefits of intergenerational programs with older adults.

171 - Jacob Wolkow

Impact of Oral Health Related Quality of Life in Older Adults

J. Wolkow, L. Mitchell

Objective: Aging is an inevitable process of life, one that everyone is experiencing both themselves and with the people around them. During the aging process older adults undergo different changes physically, socially, and psychologically. These changes, however, do not naturally include disease. Oral health is an integral part of an older adult's overall health, and the presence of disease in the oral cavity can impact not just overall health, but also overall quality of life. The measurement of a patient's oral health related quality of life (OHRQoL) is a comprehensive construct that encompasses not only the objective status of oral health, but also the subjective interpretation of functional status, personal satisfaction, and emotional status of the patient. The current research on older adults and their OHRQoL focuses on this construct and has provided much needed improved understanding of how dental practitioners can better serve their older adult patients.

Method: An online database search including Pubmed, Scopus, Embase, and Cochrane was conducted with the following parameters. Articles must have been either meta-analyses, reviews, systematic reviews or randomized control trials. All articles had to be peer reviewed, and the article must have been published no

later than 1990. MeSH terms included “oral health” and “geriatric” or “older adult” or “elderly” and “quality of life”. This search was conducted in May 2019.

Results: 71 studies met the criteria set. After assessment of the articles, 5 reviews, 3 systematic reviews, and 2 clinical studies were chosen.

Conclusions: In conclusion, the cumulative findings of all the evidence collected suggests that maintaining proper oral health and function can positively impact all aspects of older adults OHRQoL. The overall results showed that there are three main factors that contribute to the overall OHRQoL in older adults: 1) absence of pain, 2) ability to maintain proper oral hygiene and esthetics, and 3) functional ability for speech and mastication. If these three aspects of oral health can be maintained, dentists can contribute to an overall positive OHRQoL for our older adult patients.

172 - Sydney Larsen and Niki Pham

Literature Review: The Effect of Music Therapy on Dental Anxiety

S. Larsen, N. Pham, L. Mitchell

Objective: To examine the existing body of literature concerning the effect of music therapy interventions on symptoms of dental anxiety in children and adult patient populations.

Method: From a search of major electronic databases, five randomized controlled trials examining the effect of music therapy on dental anxiety were selected. A total of 105 children ages 4-12 and 355 adults ages 18-65 were included in these studies. Interventions consisted of playing pre-selected classical music or music of the patient’s choice throughout the course of a dental procedure. Dental procedures included in these studies were restorative dentistry, simple extraction, hygiene recalls, root canal treatment, and surgical extraction of impacted third molars. Levels of dental anxiety were reported through self-assessment, heart rate, oxygen saturation, blood pressure, and body temperature.

Results: The two studies examining children produced conflicting results. One found statistically significant reductions in pulse rate and self-assessment of anxiety in the experimental group, while the other found no significant changes in any variable. However, both found that patients reported enjoying the music and requested it in subsequent visits. Studies conducted in adult populations revealed similar significant reductions in self-reported anxiety, and physiological measures of anxiety. Researchers found that a 10 minute exposure time to music was enough to exert physiologic and anxiolytic effects. Additionally, a higher preference for the music correlated to a greater reduction in anxiety.

Conclusions: These randomized controlled trials suggest that music therapy interventions are successful strategies for reducing dental anxiety in adult patients. However, in pediatric patients, the literature is divided on the efficacy of this technique.

173 - Amanda Przekora and Keli Wright

Providing Patient Care for the Hearing Impaired

A. Przekora, K. Wright, L. Mitchell

Objective: The objective includes providing informative and tactile education to healthcare professions to enhance the level of care provided to hearing impaired patients.

Method: An analytical research approach was used in the writing this paper. Research was conducted to establish the severity and occurrence of patients suffering from the challenges of hearing loss. In turn, this lead to the integration of changes that can be made in a healthcare setting to accommodate patients with hearing impairment.

Results: Within the age group of 65 to 74, one out of three people suffer from hearing loss and 50% of individuals over the age of 75 have hearing impairment. 80% of people with hearing aids do not wear them not wear due to discomfort and overall dissatisfaction with the sound benefits. Medicare beneficiaries that suffered from a hearing deficit reported an overall greater displeasure with their healthcare experiences.

Conclusions: Stage one in providing enhanced healthcare for hearing impaired patients includes education and awareness. Once a care provider is informed, additive care such as sitting eyelevel with patient, removing masks, increasing length of appointments, and many other accommodations can be implemented. Although hearing impaired patient care may be an obstacle for both parties involved, the challenges can be overcome without compromising the level of care provided.

174 - Nancy Patel

Regenerative Endodontics: A Literature Review

N. Patel, S. Coble, D. Clanton

Objective: To evaluate the possibility of regeneration of pulp dentine complex in necrotic permanent teeth with open apex

Method: Articles were reviewed under pulp regeneration, effect of TAP, Clinical methods in Clinical Keys in Endodontic Journals

Results: The results indicated that there is formation of pulp like tissue mainly consisting of periodontal, bone and cementum but not actual pulp-dentine complex which helps with apical closure.

Conclusions: It was concluded that more research needs to be done regarding the regeneration of pulp but it is possible upcoming treatment modality in future.

175 - Aesha Amin and Meeshal Shah

Restorative Considerations of Surgical Crown Lengthening

A. Amin, M. Shah, M. Kim

Objective: Surgical crown lengthening is a common procedure carried out in dental practice. This procedure is usually performed through gingivectomy/gingivoplasty and/or an apically positioned flap with or without osteotomy/osteoplasty. It acts as an aid to help preserve natural dentition by reestablishing the biological width of the teeth. This literature review serves to better understand the relationship between crown lengthening and prosthetic planning.

Method: Articles with all fields function were searched on PubMed, resulting in 435 articles. Further filters were added by searching for terms with 'restorations', 'healing time' and 'prosthetic considerations of crown lengthening'. Total of ten articles were selected from this search and reviewed. The articles were a mix of literature reviews and clinical case studies. These articles focused on the interdisciplinary approach to crown

lengthening. They describe the various time intervals prior to, during or after crown lengthening surgery when restorative procedures may be initiated.

Results: Based on several articles the timeline for when to definitively prepare a tooth for a fixed restoration receiving crown lengthening vary depending on the location of the tooth/teeth, the soft tissue biotype, the esthetic requirements and subjective assessments. In several articles it is mentioned at 3 weeks, when a stable healing stage is achieved the tooth/teeth may be prepared definitively or with knife edged margins. With temporary restorations relined at various intervals to facilitate optimum soft tissue conditioning. These articles mentioned the ideal timeframe to definitively restore ranges from 3-6 months after surgical crown lengthening. Although there are some publications that state ITCL 'Immediate temporization crown lengthening' is a valid technique used to minimize chair time and take a final impression on the same day as the surgical crown lengthening. It is a common finding that clinicians prefer to wait a longer time for healing in esthetically demanding cases.

Conclusions: Based on the findings of several articles, the time range of when to definitively restore teeth after surgical crown lengthening varies. This variation depends upon the esthetic requirements as well as type, anatomy and location of soft and hard tissue. In general, in esthetic zones the length of time can be equal to greater than 6 months. In other areas it ay be as short as three months.

176 - Ankur Tyagi and Brett Silvers

A Thought to Remember: The Co-Relation Between Periodontal Disease and Alzheimer's Disease

A. Tyagi, B. Silvers, M. Kaur

Objective: To evaluate the possible link between periodontal disease and Alzheimer's disease. Alzheimer's disease, a degenerative brain tissue disorder, affects millions of people around the world. Therefore, it is paramount that the pathophysiology of the disease be identified, and all associated risk factors be established. Periodontal diseases are complex bacterial infections, in which the body's inflammatory process cause destruction of the bone that surrounds the teeth. This can lead to bone loss and loss of supporting tissue, which can cause teeth to loosen or even fall out.

Method: PubMed search for articles containing "periodontal disease AND Alzheimer's disease" and multiple online sources such as the Alzheimer Association, Centers for Disease Control and Prevention were used to gather information for this presentation.

Results: Recent studies have shown a potential connection between these two diseases, however, the exact mechanism for how they are related has not yet been established. Current hypotheses suggest several potential bacterias like *P. Gingivalis*, *Treponema* and *Actinobacillus actinomycetemcomiyans* may be involved in the progression of Alzheimer's disease. Inflammatory molecules such as Interleukin-1, 6, 10, and TNF-alpha are all possible culprits, as well. Additionally, once these patients' dementia begins to progress, they are likely to forget to brush their teeth; suggesting a behavioral link between the two diseases. All of the above are potential multifactorial links between the two pathologies.

Conclusions: Further research is needed to determine the exact mechanism by which these two diseases are connected. However, there is a growing body of evidence that suggests these two diseases are related in their pathophysiology and may contribute to each others progression. Increased knowledge on the link between periodontal disease and Alzheimer's disease has the potential to lead to different treatment strategies for these patients. These new treatment modalities may conceivably be able to slow the progression of both chronic conditions. Given this, it is impairative that medical and dental professionals

work together in order to manage the care of these patients. An interdisciplinary approach will be necessary moving forward to manage the care for these patients as new research surfaces on the link between periodontitis and Alzheimer's disease.

177 - Jaclyn Bates and Nhu-An Nguyen

The Ketogenic Diet and its Effects on Aging and Neurodegenerative Diseases

J. Bates, N. Nguyen, L. Mitchell

Objective: The ketogenic diet has been known to help maintain a healthy weight, which in turn improves overall health and longevity. The diet focuses on restricting carbohydrates while consuming adequate fats and proteins. By doing this, the body mimics a state of ketosis, where fat is burned for energy. Overall, this lowers glycemic levels by using fat and ketone bodies as an energy source instead of glucose. The diet has been used to treat certain neurological diseases, such as epilepsy, so there is further interest in its effects on aging and neurodegenerative diseases, such as Alzheimer's and Parkinson's diseases.

Method: A Google Scholar search was conducted with the following parameters. Date limits set from 2004 to present. The search was limited to reviews, systematic reviews, meta-analyses, randomized control trials, and animal studies. MeSH terms searched included "ketogenic diet", "elderly" or "geriatric", "neurodegenerative", "neuroprotective", "Alzheimer's disease", and "Parkinson's disease".

Results: 8 studies were reviewed. 4 reviews, 3 animal studies, 1 randomized control trial were chosen.

Conclusions: There are multiple neuroprotective effects seen in the ketogenic diet. Most effects were seen in the central nervous system, where the ketogenic diet influenced different processes that contribute to neurodegeneration, Alzheimer's, and Parkinson's diseases. These effects include increasing levels of neuroprotective ketone bodies in the hippocampus, reducing oxidative stress, decreasing beta-amyloid deposition, and protecting against 6-OHDA neurotoxicity. All of these effects work to prevent or slow the progression of neurodegeneration.

178 - Kelsey Gwin and Aileen Jong

The Use of Septocaine in Mandibular Posterior Infiltration

K. Gwin, A. Jong, S. Teichmiller

Objective: This literature review compares the efficacy of the two most common local anesthetics articaine and lidocaine in the mandibular posterior region during dental procedures.

Method: We will review randomized controlled trials and systematic reviews that focus on the comparison of septocaine versus lidocaine. The search will focus on the use of these anesthetics and their efficacy in the mandibular posterior region. It is clear that infiltration in the anterior mandible is effective in acquiring profound anesthesia but there is much debate about whether it is best to administer anesthesia via an Inferior Alveolar Nerve Block (IAN) or to simply infiltrate using articaine. We will analyze the history of articaine and why it is considered to be a more effective anesthetic agent. Then we will look at several randomized control trials which compare infiltrating with articaine and lidocaine in individuals with healthy teeth, irreversibly inflamed teeth and teeth needing extractions.

Results: After reviewing multiple articles, it was found that septocaine is a more effective anesthetic due to its structural differences compared to other dental anesthetics.

Conclusions: The use of articaine to infiltrate in the mandibular posterior region of the oral cavity is becoming a more commonly used practice to achieve profound anesthesia. Studies on the different chemical properties of articaine have shown its ability to penetrate bone more effectively, be better confined to the tissue it is acting upon and be quickly metabolized and excreted from the body. All of these aspects contribute to articaine's ability to provide profound anesthesia via buccal infiltration in the mandibular posterior region. In nearly all the examined randomized control trials, it is clearly shown that the use of septocaine in mandibular posterior buccal infiltrations is superior to lidocaine when attempting to acquire profound anesthesia of healthy teeth, teeth to be extracted and teeth with irreversible pulpitis. More studies need to be conducted on the chemical properties of articaine that contribute to its superiority to other similar local anesthetics but overall it is clear that septocaine is changing how we go about providing anesthesia in the molar area of the mandible.

179 - Heba Sarhan and Nolin Connell

Understanding, Diagnosing, and Managing Sleep Apnea in the Geriatric Population

H. Sarhan, N. Connell, L. Mitchell

Objective: To discuss the importance of dental health professionals understanding, diagnosing and managing sleep apnea in the geriatric population. Sleep apnea is defined as a "chronic disease that is caused by intermittent airway collapse, which impairs ventilation and disrupts sleep." Many older adult patients develop sleep apnea, however, many remain undiagnosed due to the minimal experience dentists have in sleep medicine. In addition, possible neglect by family or caregivers may contribute to the problem. Undiagnosed sleep apnea results in significant morbidity and mortality in the geriatric population. Because most patients see their dentist more often than their primary care physicians, it is crucial for dentists to expand their knowledge about sleep apnea and its management.

Method: A PubMed search was done with the following parameters. Date limits were set from 1995 to present. The search was limited to reviews and systematic reviews, meta-analyses, and randomized control trials.

Results: 1087 studies met the parameters set. Using the best match algorithm, 7 reviews, 2 systematic reviews and 1 meta-analysis were chosen.

Conclusions: Research shows that sleep apnea is linked to both morbidity and mortality. Hence, it is important for dentists to adequately expand their knowledge about diagnosing and carefully managing sleep apnea in the older adult. Doing so will decrease these patients' symptoms, their mortality rate, and improve their quality of life.

180 - Lacy Petersen and Khanh Pham

Using Interior Design to Compensate for Age-Related Changes and Promote Well-Being in Older Adults

L. Petersen, K. Pham, L. Mitchell

Objective: Buildings and interiors have physical and psychological effects on inhabitants. As a result, there has been an increased emphasis on person-centered design where physical environments are designed to fit the needs of those who function within them. The demographic in the United States is rapidly transforming into a more aged population. This requires communities, living spaces, and healthcare facilities to be designed with the unique needs of older adults in mind. The objective was to evaluate how the physical

environment in which aging adults live and receive health services can be optimized to promote well-being, independence, and longevity.

Method: A PubMed search was conducted using the search terms “elderly”, “aging”, “interior design”, “interiors”, “healthcare”, “wellness”, and “safety”. The MeSH terms “aged”, “health”, and “design” were also used to conduct a search. The results were limited to research published from 2000 to the present.

Results: The “best match” sorting feature was used to select four review articles and two primary research articles from the results that identified age-friendly design features and the impact of an environment on wellness.

Conclusions: As the population continues to age, the design of residential, commercial, and healthcare environments should support the functionality and well-being of older adults. Building design should incorporate easily navigated spaces, a connection with the natural environment, elements that provide relaxation and comfort, and consideration of the ambient environment. Geriatric-centered design can support emotional, physical, and psychological wellness, as design elements are used to mitigate age-related physical and cognitive changes.

181 - Waleed Al-Kakhan, Andrea Fenton, Nicole Rogers, Lindsey Roberts, Samantha Sackos, Prabdeep Sekhon

The General Dentist’s Guide to Evaluating the Head and Neck Radiation Patient

W. Al-Kakhan, A. Fenton, N. Rogers, L. Roberts, S. Sackos, P. Sekhon, J. Pignataro

Objective: Radiation, with or without, surgical intervention is the most common form of treatment for head and neck cancers, along with chemotherapy for high-risk or advanced disease. As oral healthcare providers, it is important for the patient, oncologist, and dentist to have interdisciplinary discussions prior to initiation of radiation therapy.

Method: A search of systematic reviews through PubMed was utilized. Key words included phrases such as “dental treatment for head and neck cancer patient” and “radiation effects on oral health”.

Results: Head and neck cancer accounts for about 4% of all cancers in the United States. In 2019, an estimated 65,410 people (48,000 men and 17,410 women) will develop head and neck cancer.

Conclusions: Intercepting delivery of medically necessary treatment prior to and during high-dose radiation therapy may reduce the risk of oral complications during and after cancer treatment. Pre-radiation consultation can assist in educating the patient and family on considerations for continued dental treatment needs throughout the patient’s lifetime. Guidelines for the general dentist can be helpful in the assessment, dental management, and treatment planning for pre- and post-radiation therapy of the head and neck cancer patient.

Undergraduate

182 - Mary Love

Comparison of Compressive Modulus of Silicone Denture Liners

M. Love, C. Huang, N. Lawson

Objective: Each silicone material has unique handling properties as well as physical properties. Unknown is how different silicone denture liner materials will cushion a complete denture during use. The purpose of this project is to evaluate the compressive modulus of 10 different silicone lining materials.

Method: Materials were fabricated in 6.5 mm x 3 mm (diameter) cylindrical molds. Materials were injected into the mold and allowed to self-cure for the manufacturer's recommended setting time. Materials were stored dry for 24 hours. The specimens were placed in a universal testing machine and compressed by 30% of their height at a rate of 10mm/min. The 30% compressive strain was an estimate of how much compression would occur clinically. The strain and stress experienced by each material was plotted in Microsoft Excel and the slope of the line was used to measure compressive elastic modulus. The compressive moduli of all materials were compared using a 1-way ANOVA and Tukey post-hoc analysis using SPSS software.

Results: The elastic modulus (mean \pm SD) of each material is presented in the table below. The 1-way ANOVA determined that there were statistically significant differences between materials ($p < .01$). Materials with different letters are statistically different: Sofreliner Soft 12.28 \pm 0.45a; Reline Extra Extra Soft 13.20 \pm 0.83 a; Bosworth Dentusil 18.59 \pm 0.78 b; Reline Extra Soft 20.36 \pm 1.10 b,c; SilkLine 21.95 \pm 0.71 c,d; Mucopren 22.01 \pm 0.86 c,d; Mucosoft 23.14 \pm 1.01 d; SoftLine 25.23 \pm 1.24 e; Sofreliner Medium 25.63 \pm 1.11 e; Reline Soft 45.88 \pm 2.20 f.

Conclusions: There are some denture reline materials which are stiffer than other materials. A softer material (lower modulus) would place less force on a patient's soft tissue during function. A stiffer material (higher modulus) may help with stability of a denture during function. The table may help guide the clinician choose a denture reline material that provides comfort and function specific for the patient.

183 - Jade Kim

Composite Staining from Spreading With Different Wetting Agents

J. Kim, S. Mankar, A. Robles, C. Arce, N. Lawson

Objective: Adaptation of a resin composite can be improved by spreading it with a wetting agent. Some clinicians use an adhesive to spread composite. Adhesives contain solvents which could affect the polymerization of composite. Many 1-step adhesives (such as universal adhesives) contain HEMA which is hydrophilic and may absorb water-based stains. Wetting resins are formulated for spreading composite and are composed of pure resin. The purpose of this project was to determine if spreading composite with a wetting resin (ResinBlend LV), an adhesive (Clearfil SE Bond), or a 1-step adhesive (Adhese Universal) would lead to more staining than spreading with a composite instrument without a wetting agent.

Method: Discs of composite (Spectra ST LV, shade A2) were fabricated in silicone molds (2mm x 8mm dia). The composite was placed in a single increment. The top surface of the composite was spread by hand using one of the 3 wetting agents with a microbrush (n=5 per wetting agent). The top surface of the control group was spread using a clean metal composite instrument. All composites were light cured for 20 seconds using a light curing unit (Elipar Deep Cure, >1000mW/cm²). The L*a*b* values of the composite specimens were

measured with a spectrophotometer (CM-700d; Konica Minolta) against a white background. Each sample was measured twice and averaged together by the spectrophotometer. The composites were stored in distilled water for 24 hours at 37C. The composites were then placed in a solution of 50mL of red wine, 3g of black tea and 3g of instant coffee at 37C. After 5 days (equivalent to 5 months), the specimens were cleaned with distilled water and gentle scrubbing with a soft-bristled toothbrush. The L*a*b* values of the composite specimens were re-measured. The delta E 2000 was calculated to measure the color change between the initial and final color of the composite specimens (higher delta E 2000 represents more color change). The delta E 2000 for each wetting agent was compared with a 1-way ANOVA.

Results: There was no difference in delta E 2000 between the composites spread with different wetting agents (p=.13).

Material: Delta E 2000

Control (metal composite instrument): 6.61 ± 1.16

Wetting resin (ResinBlend LV): 6.23 ± 0.95

Adhesive (Clearfil SE Bond): 4.98 ± 1.04

1-step adhesive (Adhese Universal): 5.42 ± 0.54

Conclusions: No negative effect on staining could be observed when composites were spread with the adhesives evaluated in this study. Perhaps other properties of composite are negatively affected by spreading with an adhesive, such as the hardness, gloss or gloss retention.

184 - Joshua Holsey

Radiolabeled Anti-EGFR for Imaging Ameloblastomas In Vivo

J. Holsey, A. Massicano, J. Warram, Y. Ying, A. Morlandt, S. Lapi, H. Amm

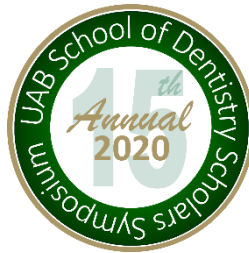
Objective: Ameloblastomas demonstrate locally aggressive and destructive behavior primarily in the posterior mandible. The ability to accurately assess tumor margins with specific, non-invasive imaging could result in the preservation of healthy tissue and improve long-term local tumor control, thereby reducing the risk of recurrence and providing appropriate reconstructive therapies with minimal morbidity. Hypothesis: Epidermal growth factor receptor (EGFR) expression in ameloblastomas may be used to specifically visualize tumors intraosseously, which may be used to assess tumor margins intraoperatively. The objective is to measure the specificity of radiolabeled 89Zr-panitumumab (an EGFR antibody) in vivo using patient-derived tumor models of ameloblastoma and positron emission tomography/computed tomography (PET/CT) scans.

Method: Patient-derived xenografts (PDX) of ameloblastoma were implanted subcutaneously into the flanks of immunocompromised mice. Following tumor establishment, mice receive 89Zr-panitumumab and are imaged 120 hours post-injection by PET/CT.

Results: In PDX of ameloblastomas from three patients (AB-36, AB-37, AB-39), the biodistribution of 89Zr-panitumumab was measured 120 hours post-injection and was reported as the injected dose per gram of tissue (%ID/g). The average tumor uptake was ~40 %ID/g for AB-36, ~65 %ID/g for AB-37, and ~20% of AB-39. The %ID/g was significantly greater in AB-36 and AB-37 tumors and the standardized uptake values (SUV) in AB-27 and AB-39 tumors from 89Zr-panitumumab-treated mice compared to those that received unlabeled panitumumab as a blocking control. MicroPET/CT imaging showed high uptake of 89Zr-

panitumumab in the ameloblastoma tumors compared to other areas of the mouse, including low uptake in the bone. Radiolabeled anti-EGFR demonstrates specificity for ameloblastoma PDX tumor xenografts.

Conclusions: We believe ⁸⁹Zr-panitumumab is an attractive target for imaging EGFR-expressing tumors. With this technology, we believe we can more accurately assess neoplastic margins for the surgical removal of ameloblastomas, thus improving patient outcomes.





SCHOOL OF DENTISTRY

The University of Alabama at Birmingham