College of Dentistry Research Day

Poster Presentation #91

Abstract Title:	**Phospholipase A2-IIA Expression Levels Associated with Oral Health, Gingivitis, and Periodontitis**
Author(s):	B. Camenisch, Division of Periodontology, College of Dentistry, U of Kentucky D. Dawson, Division of Periodontology, College of Dentistry, U of Kentucky K. Thompson, Department of Statistics, College of Arts and Sciences, U of Kentucky C. Miller, Division of Oral Diagnosis, College of Dentistry, U of Kentucky J. L. Ebersole, School of Dental Medicine, U of Nevada, Las Vegas, Las Vegas, NV O. A. Gonzalez, Division of Periodontology, Center for Oral Health Research, College of Dentistry, U of Kentucky

Abstract: Objective: Phospholipase A2 group IIA (PLA2-IIA) is a cationic enzyme with antimicrobial and pro-inflammatory effects linked to chronic inflammatory diseases. We demonstrated in vitro that P. gingivalis (Pg) specifically increase the antimicrobial activity of human oral epithelial cells through PLA2-IIA induction, and PLA2-IIA is up-regulated during initiation/progression of periodontitis in nonhuman primates. We hypothesized that the expression of PLA2-IIA will vary with gingivitis and periodontitis in humans. Methods: Saliva samples of the Center for Oral Health Research Bio-repository from healthy (n=10), gingivitis (n=10), and periodontitis (n=13) subjects were evaluated for PLA2-IIA levels by ELISA. Clinical parameters included percentage of sites with: bleeding on probing (BOP), plaque index>0, pocket depth (PD) ?4mm, and attachment loss (AL) ?2mm. Results: Percentage of BOP sites were higher in gingivitis (28.7%) and periodontitis (64.3%) patients compared with healthy subjects (7.2%). Periodontitis patients had 63.1% of sites with PD?4mm and 30.47% of sites with AL?2mm. PLA2-IIA was detectable in all samples regardless of clinical status (range: 7-100 ng/ml). Higher PLA2-IIA concentrations were observed with gingivitis and periodontitis (22 and 23 ng/ml respectively) vs. healthy samples (17 ng/ml) although these differences were not significant. Maximum PLA2-IIA concentration in healthy samples was 30 ng/ml; however, higher frequencies of samples with PLA2-IIA?30 ng/ml from gingivitis (10%) and periodontitis (23%) was observed. Conclusions: PLA2-IIA is detectable in saliva from healthy individuals with comparable levels associated with gingivitis/periodontitis patients. Periodontal disease-associated PLA2-IIA variations could be better reflected in gingival crevicular fluid and/or gingival tissues where periodontopathogens (e.g., Pg) are normally colonizing.

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Poster Presentation #92

Abstract Title:	**Pain response after SDF application on incipient to deep carious lesions determined by the Wong-Baker face pain rating scale**
Author(s):	C.M. Collett, Department of Pediatric Dentistry, U of Kentucky

Abstract: Purpose: The purpose of this study is to determine the change in perceived pain level before and after SDF application on deep carious lesions via a survey administered before SDF application and after, at theOR. Methods: Patients will be recruited at the University of Kentucky College of Dentistry, Pediatric Dentistry Residency Program. Patient requirements will be such that the patient must be a pediatric dentistry patient that is scheduled for full mouth dental rehabilitation (FMDR) in the operating room (OR). In addition, they must have at least one deep lesion. Approximately 50 patients will be included in this study. Each child's pain level will be measured using the pain face scale. The faces will be presented to the child and they will be asked, "How does your tooth make you feel?" And prompted to point to the face that indicates their pain level. Statistical analysis: T-tests were utilized. The significance levels were set at P=0.05 Results: Using the finished research cases, results have demonstrated that application of silver diamine fluoride to deep carious lesions does not cause pain level to increase. Within all of the finished cases, the perceived pain level after SDF application either remained the same or improved. No cases reported increased pain level with the selected tooth after application of SDF Conclusion: The application of SDF on deep carious lesions will not cause pain. SDF application to deep carious lesions will either have no change in pain perception or a decrease in pain perception.

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Poster Presentation #93

Abstract Title: **Dynamic Expression of JC Virus in the Urine and its Relationship to JCV Serostatus**

Author(s): B. Glatt, College of Dentistry, U of Kentucky
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R. Danaher, Department of Oral Health Practice, U of Kentucky

Abstract: This case-control longitudinal study explores the dynamic expression of JCV in urine and its correlation with JCV antibody status in patients who have multiple sclerosis (MS). Urine was monitored from 39 participants who took natalizumab, fingolimod, and other immunosuppressive medications during two 30-day study periods separated by a 6-month interval. JCV serostatus was assessed at baseline and 6 months later by the 2-step ELISA for JCV antibody (Stratify II, Biogen). JCV DNA presence and copy number in urine were determined by quantitative polymerase chain reaction and the quantity of JCV DNA in urine was correlated with JCV antibody titers. Nine participants actively shed virus in urine during the course of the first month, with seven persons shedding JCV all 30 days and two shedding JCV 28 days. JCV DNA was not detected in urine of 25 patients while JCV presence in the urine of the four remaining participants is ongoing. All JCV shedders were antibody positive (average antibody index = 2.1 above background) while 7 non-shedders were antibody positive (0.9 above background). The average titer for JCV shedders was on average much higher than non-shedders (2.6 versus 1.4). A strong correlation was found between participants who were actively shedding JCV in the urine and high serostatus (Fisher exact test, $p = 0.0028$); however, a high serostatus did not necessarily indicate that the participant was shedding virus at detectable levels. These findings revealed that patients who have MS and shed JCV at detectable levels in urine are likely to shed continuously throughout the month, and are also likely to have a high serostatus.

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College of Dentistry Research Day

Poster Presentation #94

Abstract Title: **Microneurosurgery with Allograft Leads to Improved Post-Operative Patient Satisfaction**

Author(s): J. Gribb, College of Dentistry, U of Kentucky
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Abstract: Backgroud/purpose: Trigeminal Nerve Injuries can be disruptive, causing intermittent or constant pain, speech difficulties, and other functional issues leading to a decrease in quality of life. The purpose of this study is to evaluate the relationship between the objective change in neurosensory status after Lingual Nerve (LN) and Inferior Alveolar Nerve (IAN) repair with a cadaveric nerve allograft (Avance Nerve Graft AxoGen, Inc., Alachua, Fl.) and the resultant patient satisfaction. Method: A retrospective analysis of subjective neurosensory function of 18 subjects with 20 procedures who underwent LN and IAN nerve grafting was completed. Subjects were classified as achieving functional sensory recovery by the criteria of the Medical Research Council. Subjects completed an anonymous Oral Health Impact Profile (OHIP) questionnaire for postoperative patient satisfaction. Results: The mean duration between injury and repair for LN was 5.45 + 1.38 months and for IAN was 13.57 + 17.29 months. The majority of patients (90%) with LN damage regained sensation or taste. 12 out of 18 (66.7%) patients described their postoperative patient satisfaction in the range of good to excellent. Functional sensory recovery was achieved in 65% of the nerve sites. Postoperative satisfaction significantly improved with p-values of 0.003 (LN) and 0.005 (IAN). Conclusion: These data suggest that patients suffering from injury to the IAN or LN may benefit from surgical repair with allograft (Avance Nerve Graft AxoGen, Inc., Alachua, Fl.) and show improvement from neuropathic pain and anesthesia. The majority of patients reported both improved satisfaction and oral function.

Supported by: Avance Nerve Graft AxoGen, Inc., Alachua, Fl.

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Poster Presentation #95

Abstract Title: **Fully Guided Surgical Implant Placements in Edentulous Mandible: A Case Report**

Author(s):
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A. Kutkut, Div of Prosthodontics, Dept of Oral Health Practice, College of Dentistry, U of Kentucky

Abstract: OBJECTIVES: The aim of this case report was to describe a digital workflow used to perform computer-guided implant placement in an edentulous patient in the UKCD student clinic. METHODS: Digital data for the workflow includes STL file acquired by surface scanning of the stone model of patient's current dentures using an optical dental laboratory scanner, and DICOM file acquired by cone-beam computed tomography (CBCT) following the dual-scan radiographic template protocol. The definitive digital data were used to design and produce a prosthetically driven implant position and surgical guide. The surgery was performed with a flap approach using bone reduction guide and Straumann implant guided surgery kit. A delayed loading protocol was chosen to allow a healing free of masticatory stress. RESULTS: The surgery was performed smoothly and free of complications. A good primary stability of the implants was achieved. The patient tolerated procedure and anesthesia well and referred postoperative pain and swelling as acceptable. CONCLUSIONS: This learning approach exhibits promising potential in teaching implant treatment planning and guided surgery to treat edentulous patients at UKCD - DMD clinic.

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College of Dentistry Research Day

Poster Presentation #96

Abstract Title:	**Digital Dentistry, Accuracy, Efficacy, and Workflows: A Literature Review**
Author(s):	B. F. Hall, Masters of Medical Sciences Candidate, U of Kentucky A. Kutkut, Department of Oral Health Practice, Division of Prosthodontics, U of Kentucky

Abstract: Accuracy and efficacy of dental restorations are key factors for successful dental therapy. Computer-aided design and computer-aided manufacturing (CAD/CAM) offers an additional tool for treatment planning, surgical placement and prosthetic rehabilitation in an interdisciplinary team approach. Digital dental technology is developing rapidly and the continuous technological improvement in both the computer-based development and the dental manufacturing process ensures new opportunities in the clinical digital workflow. The purpose of this literature review is to analyze a compilation of 150 peer-reviewed research articles provided by the American College of Prosthodontists. This review covers a broad range of topics that include investigations of intraoral and extraoral scanning accuracy, CBCT technology, the CAD/CAM milling of restorations, guided implant surgery, complete denture methodologies, removable partial denture techniques, and applications to maxillofacial prosthetics. Additionally, this review provides both quantitative data and qualitative perception of work time for the procedure, patient comfort, and functionality of the prosthetic/restoration for years after the procedure. The overview of these research articles allows for a broad comparison of accuracy, efficacy, and workflows between digital and conventional dentistry. Ultimately, this review provides evidence of the clinical practicality of digital dentistry and leaves practitioners with further incentive to incorporate digital dental therapy in order to increase their patients' quality of care.

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Poster Presentation #97

Abstract Title:	**Awareness, Attitude, and Expectations Toward Dental Implants among the Kentuckian Population: A Survey Study**
Author(s):	A. R. Haroun, Dentistry, U of Kentucky E. S. Khazali, Dentistry, U of Kentucky F. Ahmad, Dentistry, U of Kentucky R. Abualsoud, U of Kentucky A. Kutkut, Department of Prosthodontics, U of Kentucky

Abstract: Tooth loss is a significant problem among individuals all across many populations. With technology developing all around the practice of dentistry, dental implants are being used more frequently to replace these missing teeth. The level of an individual's awareness and knowledge about specific treatment options plays a large role in choosing their final treatment option. There is lack in literature on the level of patient awareness towards dental implants. Although many site- and population-specific surveys exist assessing population knowledge about implants, such a survey does not exist for Kentucky. The aim of this study is to measure the level of awareness, attitude and expectations toward dental implants among the Kentuckian population via a single site survey study.

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College of Dentistry Research Day

Poster Presentation #98

Abstract Title: **Expedited Orthodontic Tooth Movement Modalities**

Author(s): D. Karanth
G. J. Jacob
C. Loss

Abstract: Purpose: The purpose was to review evidence on the effectiveness and safety of three common interventions: Surgical, low-level laser therapy(LLLT) and mechanical vibrational(MV) forces, clinical effect on the rate of Orthodontic tooth Movement(OTM). Materials and methods: Electronic databases(Google Scholar, PubMed, Cochrane) were searched. Articles examining rate of OTM using one of the following approaches: surgical, LLLT, and MV. Only randomized clinical trials(RCT's) and controlled clinical trials(CCT's) were reviewed. Three reviewers independently evaluated the evidence on effectiveness of these modalities. Results: Forty-four eligible articles (28 RCT, 16 CCT) were included (1990 – 2018). Tweleve RCT's and 10 CCT's (1990-2016) on surgical approaches showed accelerated rate of OTM during the first few months without significant shortening treatment time. Seven RCT's and four CCT's (2004-2014) identified on LLLT. Seven of these studies showed significant acceleration; however, results from LLLT should be interpreted with caution due to existing heterogeneities in these studies and possible bias. Nine RCT's and two CCT's (2011 – 2018) on cyclic MV, there is limited research data that supports this supplemental appliance works. Conclusion: There are several modalities aimed to expedite the OTM, none of these interventions seem to be widely recognized as part of routine orthodontic therapy due to lack of evidence, shortcomings in research methodologies, and smaller sample size. No available evidence on the safety of these interventions. Further research with high quality RCT's, minimal heterogeneity, larger sample size with increased emphasis on treatment duration, adverse side effect, and cost-benefit analysis are required in the field of expedited tooth movement.

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Poster Presentation #99

Abstract Title:	**Digital Complete Denture: A Simple Technology for Everyday Clinical Practice**
Author(s):	A. Kutkut, Department of Oral Public Health, College of Dentistry, U of Kentucky A. Kerbaugh, College of Dentistry, U of Kentucky

Abstract: Computer Aided Design – Computer Aided Manufacturing (CAD/CAM) technology has made significant improvement in modern dentistry. CAD/CAM applications in dentistry include fabrication of inlays, onlays, crowns, fixed partial dentures, and implant abutments/prostheses. Recently, computer-aided technology is a new method commercially available for fabricating complete dentures. This system facilitates impressions, interocclusal records, and tooth selection to be completed in one appointment. The dentures are then fabricated using CAD/CAM technology and placed in the second appointment. Two commercial manufacturers in the United States are currently fabricating complete dentures with computer-aided design and computer-aided manufacturing (CAD/CAM) technology for clinicians world-wide. These manufacturers have definitive protocols and offer exclusive dental materials, techniques, and laboratory support. CAD/CAM technology allows the clinician to design complete dentures and create natural looking superstructures. The CAD?CAM technique provides precise fit, reduces number of visits and the cost of the procedure, and eliminates dimensional inaccuracies due to conventional processing techniques. The aim of this case report is to describe a simple technique for complete denture procedure using CAD/CAM technology.

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Poster Presentation #100

Abstract Title: **Total Joint Replacement for Proliferative Synovitis: A Case Report**

Author(s): A. Krisko, Department of Oral and Maxillofacial Surgery, U of Kentucky
B. Newby, Department of Oral and Maxillofacial Surgery, U of Kentucky
M. Yeoh, Department of Oral and Maxillofacial Surgery, U of Kentucky

Abstract: Proliferative synovitis is a rare disease in the TMJ. The disease is a benign yet often locally aggressive growth of the synovium. The vast majority of cases arise from the knee and the finger however proliferative synovitis of the TMJ has been documented by various other authors. The disease can have a diffuse or localized appearance. In the diffuse appearance there is often an enlarging preauricular swelling due to the enlarging synovium of the joint in the enclosed area. Treatment of proliferative synovitis depends upon the extent of the disease. If bone is extensively involved then local resection is often necessary in order to restore functionality. In this case a 62 year old male presented to UK in February of 2017 for evaluation of right TMJ pain and right ear pain. The patient began experiencing pain in the right ear starting in October of 2016. Patient then reported swelling in the right pre-auricular region for which he was given antibiotic by his general practitioner. Patient was then referred to a specialist who ordered MRI and CT scans. Scans showed osteolytic changes of the right condylar head as well as perforation of the anterior external auditory canal and posterior external auditory canal. ENT performed right tympanomastoidectomy and biopsied EAC. Pathology reports were positive for proliferative synovitis, likely from TMJ membrane. The patient then presented to UK OMFS where a total joint replacement of the right TMJ joint was performed. This poster documents pre and post operative care for this patient.

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College of Dentistry Research Day

Poster Presentation #101

Abstract Title:	**3D Printed Tooth Supported Surgical Guide for Multiple Implant Placements: A Case Report**
Author(s):	J. Ledford, College of Dentistry, U of Kentucky S. Tucker, College of Dentistry, U of Kentucky A. Kutkut, College of Dentistry, U of Kentucky

Abstract: Computer-aided implant planning allows for more accurate and precise placements of implants. Teaching current technology in dental schools allows students to stay up to date with implantology. This case report demonstrates teaching a dental student to apply computer-aided implant planning and 3D printing technology for implant-guided surgery. An 82 YOM presented to clinic with missing #2, 4, 5, 13, 14, 15, 18, 26, and 30. Patient was interested in replacing missing teeth in order to improve function. Phase one treatment had been completed. A CBCT was taken with a scan appliance in place. PVS impressions were taken of upper and lower arches. Casts of upper and lower arches were scanned, STL files were created, and the files were registered to the CBCT. Using Anatomage software, these images were used to digitally plan implants based on both the available bone and the desired position of the restorations. There was sufficient bone available to place implants in sites 4, 5, 13, 26, and 30 without a significant amount of grafting. Site #14 required a sinus augmentation in order to provide enough bone for implant placement. Patient accepted treatment plan for implants 4, 5, 13, 26, and 30 but was not willing to have a sinus lift for implant #14. Implants were not considered to replace the second molars. Surgical guides were made by Anatomage. Straumann guided kit was used for surgical placement of implants. Implants 5, 13, and 30 were fully guided. Due to space limitations, #4 and 26 were placed using a guided pilot drill with final osteotomies and implant placement completed without guide. This case report exhibits promising potential in teaching implant treatment planning and guided surgery for partially edentulous patient at UKCD – DMD clinic.

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Poster Presentation #102

Abstract Title:	**Bacterial Profiles of Newly placed Implants in Patients following Periodontal Treatment**
Author(s):	S. Litwin, College of Dentistry, University of Kentucky D.Dawson, College of Dentistry, University of Kentucky M. Al-Sabbagh, College of Dentistry, University of Kentucky S.Kirakodu, College of Dentistry, University of Kentucky P.Emecen-Huja, College of Dental Medicine, Medical University of South Carolina J.Ebersole, School of Dental Medicine, University of Las Vegas

Abstract: Several risk factors have been recognized that lead to the establishment and progression of peri-implant mucositis and peri-implantitis, many of which are linked to the presence of pathogenic bacterial species. Studies have indicated peri-implantitis sites have mostly gram-negative species but the bacterial ecologic profile following implant placement is not well elucidated. Objectives: To characterize and compare bacterial profiles around newly placed dental implants adjacent to heathy and periodontally involved teeth utilizing Next-Gen sequencing. Methods and Materials : A total of 12 test subjects and 9 control subjects were enrolled in the clinical study in which each subject received an implant as standard of care therapy. Enrolled subjects had untreated chronic periodontitis with two or more sites of probing pocket depths (PPD) ?5mm and bleeding on probing (BOP). At baseline all subjects had clinical exam, plaque samples collected then scaling and root planning. Four weeks later, control subjects had an implant placed adjacent to teeth with treated healthy sites (PPD? 4mm, no BOP) while test subjects had implants placed adjacent to treated periodontal sites (PPD?5mm with BOP). Plaque samples were collected at baseline, week 4, week 5, week 6 and 16 weeks from baseline. Each site was analyzed using Next-Gen Sequencing to identify each bacterial profiles of implants and adjacent teeth in test and control subjects. Study analysis underway:

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College of Dentistry Research Day

Poster Presentation #103

Abstract Title:	**P. gingivalis Modulates Oral Epithelial Cell Antimicrobial Responses Through Group IIA Phospholipase A2**
Author(s):	A. May, Center for Oral Health Research and College of Dentistry; College of Health Sciences, U of Kentucky Y. Alimova, Center for Oral Health Research, U of Kentucky A. Al-Attar, Center for Oral Health Research, U of Kentucky OA. Gonzalez, Center for Oral Health Research and Division of Periodontology, U of Kentucky

Abstract: Objective: We have reported that P. gingivalis (Pg) triggers a remarkable expression of PLA2-IIA in human oral epithelial cells (OECs) and that PLA2-IIA gingival levels are significantly elevated during periodontitis in non-human primates. Antimicrobial activity of PLA2-IIA has been broadly described. We hypothesized that the ability for bacterial killing of OECs could be modulated by Pg-induced PLA2-IIA. Methods: Cell lysates from OECs (OKF6) exposed or not to Pg were tested for their antimicrobial activity against the PLA2-IIA susceptible bacteria L. monocytogenes (Lm) through determination of colony forming units (CFUs). The antimicrobial role of Pg-induced PLA2-IIA was confirmed by neutralization experiments with anti-PLA2-IIA or its corresponding isotype control (IC). Antimicrobial effect of recombinant PLA2-IIA (rPLA2-IIA) was tested against selected oral bacterial species [A. naeslundii-An, S. gordonii-Sg, V. parvula-Vp, C. sputigena-Cs, F. nucleatum-Fn and Pg]. Results: Pg-challenged OEC lysates significantly reduced the number of Lm CFUs, whereas unchallenged OECs extracts did not affect bacterial growth. Pre-incubation of Pg-challenged OEC extracts with anti-PLA2-IIA, but not IC, decreased their antimicrobial activity. These Pg-induced OEC antimicrobial responses were similarly induced by rPLA2-IIA. Among all evaluated bacterial species, An and Fn exhibited antimicrobial susceptibility to rPLA2-IIA whereas Pg was resistant. Conclusions: Pg increases OEC antimicrobial responses through induction of PLA2-IIA and oral bacterial species exhibit differential anti-microbial susceptibility to rPLA2-IIA. Modulation of PLA2-IIA levels in OECs by Pg could be contributing to modify the abundance of specific bacterial species within the oral microbiome (i.e., dysbiosis).

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Poster Presentation #104

Abstract Title: **Study of Sella Turcica Morphology and Palatally Displaced Canine Occurrence**

Author(s):
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Abstract: Objective: Based on the evidence of a common neural crest cell origin between the Sella Turcica (ST) and the teeth, this study will determine whether a relationship exists between ST bridging (calcified-fusion of anterior and posterior clinoid process) and the occurrence of palatally displaced canines (PDCs). Our null hypothesis stated that there will be no association between ST bridging and the PDCs occurrence. Methods: IRB oversight for this in-progress study is being provided by Indiana University and the University of Kentucky. Lateral cephalometric images of 66 Caucasian subjects (30 male,36 female), diagnosed with PDCs, have been identified in clinical records and will be compared with images from 198 age, sex and ethnicity matched controls with normal canine eruption (90 males,108 females). Age matching was based on the subject's age at the end of treatment (time at which ST shape will be measured). All subjects ranged in age from 14-22 years. For measurement purposes, the contrast of the radiographs is adjusted and the size of ST (Length, depth, and diameter) will be measured digitally with the Dolphin software. The linear measurements of Sella will be analyzed for normality and the association of ST bridging with the occurrence of PDCs will be analyzed by Chi-square test. Future directions: If an association is confirmed, DNA from each subject will be genotyped to determine whether a specific gene is associated with ST bridging and PDC and the relationship of individual genotypes with ST bridging and PCDs will be examined by Chi-square and logistic regression.

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College of Dentistry Research Day

Poster Presentation #105

Abstract Title: **Restorability of Primary Teeth with SDF on Deep Carious Lesions**

Author(s): K. Newton, U of Kentucky

Abstract: Purpose: The purpose of this study is to determine the clinical response of pulpal tissue after application of SDF, in primary teeth with deep carious lesions via visual exam, tactile sensation, (when possible) radiographic exam and restorability. Methods: Patients will be recruited at the UK Pediatric Dentistry Residency Program. Patient requirements will be such that is in need of for full mouth dental rehabilitation (FMDR) in the operating room (OR). In addition, they must have at least one deep lesion (*). Approximately 50 patients will be included in this study. Each child will be examined visually and with tactile sensation; “Deep” lesions will be classified as: “25% or more of the tooth is grossly carious and has a soft and mushy consistency,” and radiographs (if available) will be used as a baseline for the first visit and a rating of restorability will be treatment planed, to compare to radiographs taken in the OR the day of the procedure to determine restorability and the extent of changes that have occurred since the initial visit. The tooth will once again be given a number to rate how it was restored. Results: Using the finished research cases, results have demonstrated that application of silver diamine fluoride to deep carious lesions increases the restorability of the tooth. Within all of the finished cases tertiary dentin was laid down. Conclusion: The application of SDF on deep carious lesions appears to increase restorability of primary teeth. It seems to cause no clinical response to the pulp.

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Poster Presentation #106

Abstract Title:	**Peri-Implantitis: Etiology, Treatment Modality, and Clinical Case report**
Author(s):	A. Kutkut, Dept of Oral Health Practice, Div of Prosthodontic, College of Dentistry, U of Kentucky J. Parker, College of Dentistry, U of Kentucky

Abstract: Dental implant therapy is considered a safe and predictable method of replacing extracted or missing teeth. However, a number of complications may occur in association with implant dentistry, one of which is periimplantitis. Periimplantitis is defined as an inflammatory process affecting the tissue around a dental implant; the condition is characterized by soft tissue inflammation and loss of the bone supporting the implant. The ultimate goal in treating periimplantitis is gaining reosseointegration of the infected implant surfaces. Several methods have been used in an attempt to achieve this goal, including conservative and regenerative treatment in conjunction with several techniques for decontaminating (i.e., disinfecting) the infected surfaces. One of the most recently reported techniques for achieving dental implant decontamination and gaining reosseointegration in both animals and humans is the use of a soft tissue surgical laser. The findings of several studies suggest that the soft tissue surgical laser is an effective therapeutic modality in the treatment of periimplantitis. The aim of this poster is to report a case involving implant complications that were treated with various methods aimed at enhancing the process of reosseointegration.

Supported by:	Ahmad Kutkut,Associate Professor, Chair UKCD Implant Board, Director of Predoctoral Implant Program, University of Kentucky, College of Dentistry, Department of Oral Health Practice, Division of Prosthodontics

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Poster Presentation #107

Abstract Title:	**Digital Workflow for Full Arch Maxillary Implant Rehabilitation with Monolithic Zirconia: Literature Review and a Case Report**
Author(s):	A. Kutkut, College of Dentistry, Department of Prosthodontists, U of Kentucky A. Rashwan, College of Dentistry, U of Kentucky

Abstract: Background: Zirconia is widely used in dentistry for the fabrication of single crowns, implant abutment, fixed dental prostheses (FDPs) and complete arch frameworks with the aid of computer-assisted design/computer-assisted manufacturing (CAD/CAM) technology. Monolithic Zirconia can become the favorable material of choice to treat edentulous patients using full arch maxillary implant rehabilitation as treatment option. Aim: The purpose of this literature review is to evaluate the clinical advantage of monolithic zirconia restorations and case report to describe the workflow of maxillary full arch implant rehabilitation with monolithic zirconia prostheses. Discussion and Conclusions: Full- arch maxillary implant rehabilitation with monolithic zirconia has shown advantageous short-term success rates as well as high patient satisfaction rates. Corrections in occlusion, esthetics, and phonetics have been noted, as well as an increase in accuracy in delivery of the final prosthesis. The digital technology and the CAD/CAM technology offer significant benefits for the prosthodontic treatment of the edentulous patient. The main benefit from the use of monolithic ceramics was the reduction of the possibility for porcelain fracture. Zirconia as a prosthetic material does not seem to cause more antagonistic tooth wear, however, the effects of grinding zirconia remain unknown.

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College of Dentistry Research Day

Poster Presentation #108

Abstract Title:	**The implication of orally administered Erythritol to patients with Early Childhood Caries following full mouth dental rehabilitation (FMDR).**
Author(s):	A. Reddy, College of Dentistry, U of Kentucky C. Perez, College of Dentistry, U of Kentucky

Abstract: Early childhood caries (ECC) is one of the most prevalent chronic conditions affecting children between ages 2-5 today. The primary bacterial class involved in the progression of ECC is Streptococcus mutans which reintroduces itself into the oral cavity three months following full mouth rehabilitation. One unexplored area in reducing repopulation by S. mutans lies in the administration of erythritol following each meal. This pilot study is investigating the implications of oral administration of erythritol via lollipops on rehabilitated ECC patients using a cohort of 15 patients to date. Methods: A cohort of children undergoing FMDR will be measured pre-operatively for levels of oral Streptococcus mutans present in the saliva. One week, 3, 6, 9, 12 months following the FMDR, we will measure the bacterial count again. One group of these children (the experimental group) will be randomly selected for oral administration of Erythritol following dental treatment. Statistical methods: A two sample t-test will be performed. The significance levels were set at P=0.05 Results: Using the finished research cases, results have demonstrated that the administration of Erythritol decreases the presence of application of Streptococcus mutans present in the saliva of children that have undergone FMDR compared to those who have not used erythritol Conclusion: The Use of erythritol after each meal decreases the presence of oral bacteria that causes caries.

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Poster Presentation #109

Abstract Title: **Periodontitis correlations to Societal Disadvantages: A retrospective analysis**

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Abstract: Background: Gingivitis is a highly prevalent disease in the US affecting over 50 percent of the adult population. If untreated it progresses to periodontitis, a chronic inflammatory disease resulting in the loss of gingival tissue and alveolar bone that can ultimately lead to tooth loss and edentulism. Current literature shows that periodontal disease disproportionately affects those from disadvantaged backgrounds. However, limited research detailing the relationship between disease progression and low socio-economic status (SES) exists, specifically the potential consequence of decreased social mobility and thus, economic capital. Even less is known of the long-term impact on intergenerational social mobility. Objective: The goal of this study is to assess the prevalence of periodontitis in higher and lower SES groups. Methods: Data from charts of 1000 adult patients of the University of Kentucky College of Dentistry clinics was collected (500 Medicaid patients and 500 non-Medicaid patients) and included presence of periodontitis and treatment provided (SRP or Prophy) within the groups. Charts with insufficient data were excluded from final analysis. Results: Of 373 Medicaid charts with sufficient data, 119 patients had a diagnosis of periodontitis (31.9%) and only 74 of those had SRP; whereas of the 292 non-Medicaid charts, 65 patients were diagnosed with periodontitis (22.3%) with 29 having SRP. Conclusions: These results reinforce the positive correlation between incidence of periodontitis and low SES. Future prospective studies of low SES individuals with periodontitis would allow further evaluation of potential causal effects of periodontitis on societal gains/social mobility.

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Poster Presentation #110

Abstract Title:	**Reconstruction of Near-Total Glossectomy with Anterolateral Thigh Free Flap: A Case Presentation**
Author(s):	B. Salmon, Department of Oral and Maxillofacial Surgery, U of Kentucky M. Yeoh, Department of Oral and Maxillofacial Surgery, U of Kentucky B. Newby, Department of Oral and Maxillofacial Surgery, U of Kentucky

Abstract: Oral cancer is a public health concern, representing the sixth most common malignant neoplasm worldwide. Oral squamous cell carcinoma represents more than 90% of malignant neoplasms of the mouth. Surgery is considered the gold standard to achieve tumor control, but the diagnosis is usually late when the disease has already reached an advanced stage. For this reason, neoplasm dimensions, combined with the necessity of clear margins at least 1 cm around the tumor, lead to large resections requiring reconstructive surgery with important functional implications. Today this aim can be achieved through the use of microvascular free flaps that have replaced classical local and regional flaps to ensure oncologic radicality on one hand, better functional and aesthetic results on the other. In March of 2017 a 73 y/o male referred from outside oral surgeon for evaluation of a biopsy proven SCCA of the right tongue. CT Neck with contrast showed a large enhancing mass in the right tongue measuring 5 x 2.5 x 2.5 cm with extension to the neurovascular bundle of the right sublingual space, slightly across midline, and across the glossotonsillar sulcus to the right palatine tonsil. On 3/21/27, procedures performed included: Anterolateral thigh free flap with microvascular anastomosis, tracheotomy, neck vessel exploration, direct laryngoscopy, partial glossectomy and resection of malignant tumor of base of tongue, bilateral modified radical neck dissection. Success rates of microvascular free flaps have improved to between 95-99% for experienced surgeons, and present a viable options for treatment of head and neck cancers.

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Poster Presentation #111

Abstract Title: **A Comprehensive OSCE Identifies Students at Risk of Failing Boards**

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Abstract: The Objective Structured Clinical Exam (OSCE) has been utilized in education for decades. The University of Kentucky College of Dentistry implemented a comprehensive OSCE combined with a computer case-based exam at the end of the 3rd year. Objective: Our hypothesis is the comprehensive OSCE results can accurately identify students that are at risk for failure of the NBDE Part II. Methods: The exam composition mirrored the percentage of clinic time spent with each discipline (n=75 questions). The distribution of questions was calculated via relative value units (RVUs) per discipline divided by total RVUs produced over a 2-year period. IRB exemption was obtained to compare the OSCE results of the classes of 2015 and 2016 (n=117) to the pass/fail results of their first attempt at boards. The OSCE to boards pass/fail relationship was compared to class rank to boards pass/fail relationship. Significance was determined by regression models. Results: Both OSCE and class rank were significantly associated with pass/fail results of boards (OSCE: p-value=0.0002, Rank: p-value=0.0003). The OSCE R-square value was higher than the class rank. However, when both the OSCE and class rank were charted together results became even more specific. Conclusion: The OSCE score, when combined with class rank, identified a population of students at risk of failing NBDE Part II. The model's predictions were accurate, as 92% of students who failed were in the identified population. These findings could provide an opportunity to implement an intervention specific to at-risk students who need tailored preparation for the NBDE Part II.

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Poster Presentation #112

Abstract Title:	**Teaching Dental Students to Plan and Fabricate Implant Surgical Guides using Prosthetic-driven Computer-aided Implant Planning Software. A case report**
Author(s):	S. Thompson, College of Dentistry, U of Kentucky S. Childers, College of Dentistry, U of Kentucky W. Preston, College of Dentistry, U of Kentucky A. KutKut, Prothodontics, College of Dentistry, U of Kentucky

Abstract: The use of implants in dentistry is a field that continues to grow in potential and use. It has become the standard to offer implants as a good option in patient treatment and many patients now desire this solution. Therefore, it makes sense that pre-doctoral programs should strive to keep pace to deliver practitioners competent and well trained in this field to meet patient demand. The University of Kentucky College of Dentistry (UKCD) has taken many strides to meet this demand. UKCD has now set the goal that every pre-doctoral student now places at least two single-tooth implants. This case report will discuss how UKCD is implementing this program and the ways that digital dentistry can aid the development of a proficient dentist in training. Providing students with knowledge of digital dentistry and how that can be applied to the growing field of implantology is a priority that UKCD has invested its resources towards. Selection of cases, thorough planning utilizing CBCT and CAD/CAM technology, and having faculty with extensive first-hand knowledge of the field are all aspects that UKCD is now utilizing to advance the education of the student dentist.

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Poster Presentation #113

Abstract Title:	**Bilateral Warthins Tumor: A Case Presentation**
Author(s):	L. Tibbitts, Oral & Maxillofacial Surgery Department, U of Kentucky M. S. Yeoh, Oral & Maxillofacial Surgery Department, U of Kentucky B. Newby, Oral & Maxillofacial Surgery Department, U of Kentucky C. Taylor, Oral & Maxillofacial Surgery Department, U of Kentucky

Abstract: Salivary gland tumors represent 3% of all head and neck tumors. Warthin's tumor is the second most common benign neoplasm of the parotid (6-10% of salivary gland tumors) with pleomorphic adenoma tumors as the most common (70%). Warthin's tumor has a high correlation with smoking and age predilection for the 6th and 7th decade. Clinically it appears as an asymptomatic limited oval mass located near the angle of mandible. In rare cases, patients may present with discomfort, otalgia or deafness. This tumor ordinarily presents as a slow-growing mass with an average size of 4 cm; however, untreated lesions can reach 10 cm or more in diameter. A case presentation of a 75 year old male with bilateral warthin's tumor is discussed with surgical treatment and prognosis. The benign tumor has an excellent prognosis due to the low rate of recurrence. Surgical eradication is often needed because of the tendency of the mass to continue to grow.

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College of Dentistry Research Day

Poster Presentation #114

Abstract Title:	**Assessment of the quality and quantity of bone regeneration in the maxillary sinus using Osteocel with scaffold or allograft materials: A radiographic and histomorphometric randomized controlled clinical study**
Author(s):	J.D. Whitt, Department of Periodontology, U of Kentucky A. Kutkut, Department of Restorative Dentistry, U of Kentucky D.R. Dawson, Department of Periodontology, U of Kentucky M. Al-Sabbagh, Department of Periodontology, U of Kentucky E. Shehata, Department of Oral Surgery, U of Kentucky

Abstract: Purpose: Over the past decade, tissue engineering has become an increasingly important consideration in implant dentistry. Recent systematic reviews of human studies show higher bone regeneration when applying mesenchymal stem cells compared to that of controls. The purpose of this study is to histologically and radiographically evaluate, then analyze, bone volume and density with reference to percentage of vital bone after maxillary sinus grafted with Osteocel Plus (a stem cell product), and a conventional cortical-cancellous allograft. Materials and Methods: This study will be a single site, randomized, controlled clinical investigation. Twenty sinuses (10 patients) with bilateral edentulous posterior maxillary site requiring sinus augmentation and bone grafting followed by implant placement. Patients are recruited from the University of Kentucky College of Dentistry dental clinics. At the time of sinus augmentation, one sinus is grafted with Osteocel Plus, an allograft cellular bone matrix, while the contralateral sinus is grafted with alloOss, a conventional cortico-cancellous allograft. CBCT scan is taken at baseline before sinus augmentation procedure as standard of care and at 3.5 months just prior to implant placement as standard of care. The bone width and height is measured preoperative and postoperative of the grafted site. Forty trephined core samples are retrieved surgically from two areas of each grafted lateral window at the time of implant placement. One core sample will be retrieved from the anterior area and the other will be retrieved from the posterior area for histomorphometric analysis. Results: Study is underway.

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College of Dentistry Research Day

Poster Presentation #115

Abstract Title:	**Brainstem EPAC Contribute to Orofacial Mechanical Hypersensitivity after Trigeminal Nerve Injury in Mice**
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Abstract: cAMP signaling plays a key role in regulating pain sensitivity. We employed a mouse trigeminal inflammatory compression (TIC) model to ask whether exchange protein directly activated by cAMP (EPAC) contributes to orofacial neuropathic pain. TIC injury was established in male C57BL/6 mice (20-25g) with placement of a 2 mm 5-0 chromic gut suture along the infraorbital nerve at the level of the infraorbital groove. Orofacial mechanical sensitivity at the whisker pad was assessed with graded von Frey filaments, using an up/down approach. The EPAC1/2 inhibitor ESI-09 (1, 3 or 10mg) was applied via the intracisternal route (i. cist. 5ml) to target the brainstem. For future studies to address the contribution of EPAC to pain affect, we asked whether gabapentin (100mg/kg, i.p.) could produce conditioned place preference paradigm in the setting of TIC injury. As previously reported, TIC injury produced a robust and persistent mechanical hypersensitivity at the ipsilateral whisker pad. TIC was associated with gabapentin-paired chamber preference as compared to vehicle control (n=11). Gabapentin did not significantly change chamber preference in sham controls (n=5). Intracisternal ESI-09 dose-dependently attenuated mechanical hypersensitization at the whisker pad (n=6/group). The most effective dose of 10mg, almost completely reversed mechanical thresholds to pre-surgery baseline ($p<0.001$). The effect began within 30 minutes, peaked at 1 hour and subsided within 2 hr. We conclude that EPAC in the brainstem contributes to orofacial mechanical hypersensitivity after trigeminal nerve injury, and ongoing TIC studies are evaluating the effect of EPAC1 and EPAC2 on the affective component of pain.

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College of Dentistry Research Day

Poster Presentation #117

Abstract Title: **Hydroxyapatite Crystal Production by Epithelial Keratinocytes in vitro**

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Abstract: Objective:In vitro utilization of oral epithelial keratinocytes to produce Hydroxyapatite crystals that resemble human tooth enamel Materials & Methods: Immortalized Murine Oral Keratinocytes are chronically treated with TGF?1 for 6 days. Cells were harvested and resuspended in Matrigel and seeded into 24-well plates and treated with serotonin for 10 days. Followed by 10 days in a mineralization solution. After fixation, the biomaterial is then harvested and molded into a sphere. Sample characterization was performed using a dual-beam scanning electron microscope with focused ion beam (FIB) Both secondary and backscattered electron images were recorded for all samples. Using the FIB, a thin lamella of the sanitized biomaterial was lifted out from the sample for scanning transmission electron microscope imaging. In order to determine the elemental composition of samples, x-ray energy dispersive spectroscopy was performed on both the bulk specimen and lift-out lamella. Results: Chronic treatment with TGF?1on (IMOK) induced a phenotypic changes including cellular hypertrophy, separation of the cells and acquisition of a cuboid shape. After that, organoids were formed by culturing the cells in Matrigel and treatment with serotonin. IHC showing positive amelogenin and alizarin red staining demonstrating organoids mineralization. Material was harvested and collected into an aggregate block. SEM image of showed the crystalline structure and x-ray energy dispersive spectroscopy, showed the composition of the synthesized sample Conclusion: Characterization of the structure using scanning electron microscopy and related techniques of the grown materials (natural enamel) reveals a strong similarity to the hydroxyapatite crystals that occur in tooth enamel

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Poster Presentation #118

Abstract Title:	**Full Mouth Implant-retained Prostheses for a Patient with Marfan Syndrome**
Author(s):	K. Brown, College of Dentistry, U of Kentucky A. Kutkut, Department of Prosthodontics, U of Kentucky M. Al-Sabbagh, Department of Periodontics, U of Kentucky D. Damm, Department of Oral Pathology, U of Kentucky

Abstract: Objective: The purpose of this case report is to present the course of treatment for a 56 year old female with Marfan syndrome who was treated with implant-retained maxillary and mandibular complete dentures. Marfan syndrome is an autosomal dominant disorder that involves the mutation of FBN1 gene on chromosome 15, which affects fibrillin-1. Case report: Patient had prior periodontal involvement with scaling and root planning done in 1995 and maintenance thereafter. Periodontal disease progressively worsened and led to the extraction of some involved teeth. A decision was made that implant-retained maxillary and mandibular complete dentures were the best course of treatment. Sinus augmentation was performed bilaterally in maxilla six months prior to full mouth extraction, alveoloplasty, and immediate placement of nine implants in 2015. Immediate complete dentures for both upper and lower were delivered. Complete maxillary and mandibular over-denture fabrication began after 4 months of healing. The patient was seen regularly throughout the healing process for peri-implant maintenance. Soft tissue grafts were done in order to gain attached gingiva around each implant after delivery of final complete over-dentures. Treatment is ongoing. Conclusion: After the sinus augmentation, implant integration, and fabrication and placement of the prostheses, the patient is functioning well with no major complications aside from retention. For patients with Marfan syndrome, implant-retained prostheses prove to be a highly functional treatment option. Histology supports new bone formation in areas of bone grafting and implant placement.

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Poster Presentation #119

Abstract Title:	**Genetic Association Analysis of Novel Markers on Chromosome 17 with Dental Agenesis**
Author(s):	K. Gibson, Division of Orthodontics, College of Dentistry, U of Kentucky J. K. Hartsfield, Department of Oral Health Science, Center for Oral Health Research, U of Kentucky C. Wang, Department of Biostatistics, U of Kentucky L. A. Morford, Department of Oral Health Science, Center for Oral Health Research, U of Kentucky

Abstract: Objectives: Dental-agenesis has been associated with other medical conditions, including colorectal and ovarian cancer. While the WNT/AXIN-pathway may play a role in this type of dual phenotype, few studies have explored cancer-associated-markers for their association to dental-agenesis. This study examined single-nucleotide-polymorphisms (SNPs) on chromosome-17 that were previously associated with cancer as potential markers of dental-agenesis. Our null hypothesis stated that there would be no association between the SNPs (rs7405776, rs7501939, rs9303542, rs2084881, rs183211, rs9730) and patients with dental-agenesis compared to controls. Methods: Following informed consent, saliva and family-medical/dental-history was obtained from biologically-unrelated Caucasian subjects with hypodontia (agenesis of 1-to-5 adult non-3rd-molar-teeth), oligodontia (agenesis of ?6 adult non-3rd-molar-teeth) or no-agenesis (controls). Genomic-DNA isolated from the saliva was used for genotyping. Results were compared between groups. Results: To date, 121 subjects have been recruited: 41-hypodontia-cases, 7-oligodontia-cases, and 73-controls. The predominant teeth affected by agenesis in this population were the mandibular-2nd-premolars, maxillary-lateral-incisors, and maxillary-2nd-premolars. Preliminary data show a potential genotypic shift for SNPs rs183211 (GG/AG/AA) and rs9730 (CC/CG/GG) when comparing hypodontia-cases and controls; where rs183211 yielded (71.1%/26.3%/2.6%) versus (58.5%/33.8%/7.7%), and rs9730 showed (74.3%/25.7%/0%) versus (76.1%/17.4%/6.5%), respectively. Recruitment is ongoing. Final statistical observations will be summarized in the presentation. Conclusion: Both rs183211 and rs9730 reside on 17q21.32 within the N-Ethylmaleimide-Sensitive-Factor(NSF) and Pleckstri-Homology-Domain-Containing-Family-M-Member-1(PLEKHM1) genes, respectively. Based on literature findings we know that NSF protein functions as a vesicle-fusing-ATPase, while PLEKHM1 plays a key role in bone resorption and may participate in osteoclast intracellular vesicle transport. Their role in connection with dental-agenesis remains to be determined.

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Poster Presentation #120

Abstract Title:	**Gingival Expression of Neuropeptides during periodontal disease in Non-Human Primates ?**
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Abstract: Objectives: Neuropeptides (NPs) are innate pivotal regulators of the immunoinflammatory response. Nevertheless, their role in the pathogenesis of the periodontal disease remains unknown. We sought to determine the changes in gene expression of 10 NPs and 16 NP receptors (NPRs) coincident with the initiation, progression and resolution of periodontitis. Methods: The ligature-induced periodontitis model was used in rhesus monkeys (n=18). Gingival tissue samples were taken at baseline pre-ligature, 2 weeks and 1 month (Initiation), and 3 months (Progression) post-ligation. Ligatures were removed and samples taken 2 months later (Resolution). Total RNA was isolated from tissues and the Rhesus Gene Chip 1.0 ST (Affymetrix) used for NP/NPR gene expression analysis. Gene expression was validated by qPCR and immunohistochemistry. Results: Unexpectedly, the expression of pro-inflammatory NPs/NPRs did not change during periodontitis or with resolution. However, increased expression of the anti-inflammatory NPs, adrenomedullin (ADM) and galanin (GAL), and the NPRs, Calcitonin Receptor-like (CALCRL) and receptor activity modifying Protein-2 and 3 (RAMP-2, and -3), were observed during initiation and progression of disease. Immunohistochemistry analysis suggested that expression of selected NPs/NPRs was mainly associated with inflammatory cells but not the oral epithelium. Conclusion: Initiation and progression of periodontitis involve significant overexpression of ADM, GAL, CALCRL, RAMP2, and RAMP3. These anti-inflammatory NPs/NPRs could play a role in the unresolved infection and inflammation that normally drives tissue destruction in periodontitis. Future mechanistic studies to validate their role in the pathogenesis of periodontal disease would be needed.

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College of Dentistry Research Day

Poster Presentation #121

Abstract Title:	**Demographic Data Analysis of HPV(+) and HPV(-) Oral and Pharyngeal Cancers: National and Kentucky Averages**
Author(s):	AP Marcum, College of Dentistry, U of Kentucky LA Morford, Department of Oral Health Science, U of Kentucky

Abstract: Introduction: In the past, the majority of oral cancer cases that were diagnosed and treated by physicians were largely associated with heavy tobacco and/or alcohol use. Since the early 1980's, however, the total number of diagnosed oral cancer cases in the US has been rising, despite a decrease in number of people using tobacco and/or alcohol products. This change has been largely due to an increase in the number of human papilloma virus positive (HPV+) oral cancer cases, which appear to be affecting younger individuals, particularly men, than oral cancer due to smoking and/or alcohol. We are not aware of recent studies focusing on trends in Kentucky, hence the aim of our study is to compare and contrast recent demographic data for the prevalence, short and long-term survival rates and risk/co-factor data of patients with HPV+ and HPV- oral and pharyngeal cancers. Methods/Project Progress: After UK IRB review, our proposed data collection from within the "National Program of Cancer Registries (NPCR) and Surveillance, Epidemiology and End Results (SEER) Incidence" De-identified Research Database has been classified as non-human subjects research. We are in the process of gathering national and Kentucky-specific data from 2001 to 2014 for cancers of the oral cavity and pharynx. We desire to learn more about the demographic changes in the occurrence and survival rates of HPV+ oral cancer particularly in the base of tongue, tonsils and oropharynx over time. Ultimately, we will compare our findings to changes in HPV- smoking/alcohol-related oral cancer nationally and within Kentucky.

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College of Dentistry Research Day

Poster Presentation #122

Abstract Title:	**Comparison of Skeletal Class III Facial Sub-phenotypes in African Americans, Caucasians, and Hispanics**
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Abstract: Objective: The goal of this study was to determine the predominant skeletal Class III facial sub-phenotype(s) among differing ethnicities. Our null hypothesis stated that African American (AfrAm), Caucasian (Cauc) and Hispanic (Hisp) populations would exhibit the same predominant skeletal Class III sub-phenotype. Methods: This retrospective study was conducted with ethics approval from the University of Kentucky (UK) IRB. Photos and cephalometric data stored in the UK Orthodontics Dolphin Clinical Imaging database were used to pre-screen subjects for inclusion in the study based on ethnicity, ANB < 0.3, and Wits < -3.0. Qualified cases were coded and retraced by a single examiner for consistency. Case records were retained for further study when retracing confirmed an ANB < 0.3 and Wits < -3.0. Syndromic patients and cases of developmental delay, Cleft Lip/Palate, or other craniofacial anomalies were excluded. Cases with missing lateral incisors were also excluded. Ten angular cephalometric measures, six ratios of a selected number of linear measurements, Wits, and overjet were examined for normality, and were compared using an ANOVA across sex and ethnic groups. Results: ANB, MP-SP, MP-FH, PP-MP, SN-FOP, PP-FOP, and SN-PP angles were not statistically different by sex and ethnicity. Similarly, Wits and ratios of Co-Go/Co-Gn, Go-Gn/N-Me, LAFH/TAFH and Co-Go/S-Go did not differ by sex and ethnicity. Trends of smaller SNA and SNB angles were observed in the Caucasians compared to the AfrAm and Hisp. The Tukey-Kramer Means Comparison revealed significant differences in facial angle (FH-Npo) and overjet between Cauc and AfrAm subjects. In addition, ratios for posterior-vertical-height (S-Go) to Mandible length (Co-Gn), and mandible-length (Ar-Gn) to posterior-vertical-height (S-Go) were significantly different by Tukey-Kramer Comparison between Cauc and AfrAm females. Co-A/Co-Gn was significantly different by Tukey-Kramer Comparison between Cauc and AfrAm males. Conclusion: We rejected our null hypothesis. Geometric morphometrics are underway using (X,Y) coordinate data generated in Dolphin.

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