2011 Annual Session Research Abstracts

The American Academy of Pediatric Dentistry (**AAPD**) is dedicated to the advancement of research related to improving children's oral health and the specialty of pediatric dentistry. To fulfill part of this mission, AAPD supports many research awards, grants, and fellowships. The following research abstracts have been chosen by subcommittees of the AAPD Committee on Scientific Affairs and are presented during the 2011 AAPD Annual Session in New York, New York, on May 28, 2011.

Note: These research abstracts have not been edited by the AAPD editorial staff. The abstracts are published as received from the authors, except for changes in style. Any errors in content are the responsibility of the contributors, not of Pediatric Dentistry, the journal of the American Academy of Pediatric Dentistry.

AAPD NuSmile Graduate Student Research Awards Competition Abstracts

The NuSmile Graduate Student Research Awards (GSRA) competition is comprised of current and recent pediatric dentistry postdoctoral students/residents. Following an application process, up to 8 finalists are chosen to present their research at the Annual Session. The recipient judged to have accomplished the most outstanding research (based on their manuscript and presentation) will receive the Ralph E. McDonald Award. The following are the 2010-11 NuSmile GSRA recipient abstracts:

Early Post-traumatic Levels of Alveolar Socket Biomarkers Predict Ankylosis. Beck S*, Subramanian K, Kumar P, Kumar A, McTigue D (The Ohio State University; Nationwide Children's Hospital, Columbus, OH)

Research supported by the Department of Dentistry, Nationwide Children's Hospital; and The College of Dentistry, The Ohio State University.

Purpose: To investigate post-avulsion levels of biomarkers in alveolar socket and pulp tissue as predictors of future ankylosis.

Methods: Informed consent was obtained from eight to eighteen year old patients presenting to the Emergency Department with traumatic avulsions of maxillary anterior teeth. Clinical data and alveolar socket irrigant were collected prior to replantation and pulp tissue was extirpated within 7-21 days following avulsion. The levels of 27 cytokines, growth factors and chemokines were analyzed in paired samples of socket irrigant and pulpal tissue using a multiplexed bead-based flow cytometric assay. Clinical and radiographic healing was monitored over six months and ankylosis was diagnosed based on International Association of Dental Traumatology guidelines. Kruskal Wallis analysis was used to compare the levels of cytokines between the groups.

Results: Eighteen teeth were included in the study; 12 teeth were diagnosed as ankylosed. There were no differences in total extra-alveolar time, period of splinting, and type of transport medium between the two types of healing. Socket irrigants of ankylosed teeth exhibited significantly higher levels of cytokines IL2, IL15 and TNFα ($P<0.05$), while pulpal tissue demonstrated significantly higher levels of IL1β, IL2, IL5 and IL15 ($P<0.05$). IL2, IL15, GM-CSF and FGF Basic were detected only in socket irrigant of ankylosed teeth and IL-15 was detectable only in pulp tissue of ankylosed teeth.

Conclusion: The data suggest that the up or down-regulation of various inflammatory mediators could profoundly affect the outcome following avulsion injuries and that IL2 & IL15 could serve as predictors of ankylosis.

Streptococcus mutans Genotypes Associated with Caries among High Risk Children. Cheon K*, Moser SA, Whiddon J, Momeni S, Kempf MC, Wiener H, Ruby JD, Childers NK (University of Alabama at Birmingham, Birmingham, AL)

Research supported by NIDCR grant #DE016684.

Purpose: To investigate the relationship between *Streptococcus mutans* and caries among a high caries risk children.

Methods: As part of an IRB approved longitudinal cohort study conducted a rural community in Alabama, a subset of 38 (5-6 year old children that had *S mutans*) was investigated by collecting plaque from molar teeth at baseline. Genomic DNA was processed to identify *S mutans* genotypes (G) using repetitive extragenic palindromic PCR and microfludics technique. Primary decayed, missing and filled tooth surfaces (dmfs) for each child were recorded. Colony forming units (CFU) of *S mutans* were obtained using standard bacterial culture methods. Univariate analyses were conducted to evaluate the association between *S mutans* genotypes, CFUs, and dmfs.

Results: Thirteen different genotypes were identified from 482 *S mutans* isolates. The prevalence of a higher number of genotypes within an individual was significantly associated with caries ($\chi^2=3.98$, $P=.046$). Of the most common four *S mutans* genotypes, the presence of two were associated

with increased caries prevalence (G6: χ^2=6.08, *P*=.002; G18: χ^2=5.80, *P*=.003), while two were associated with decreased prevalence (G1: χ^2=4.56, *P*=.033; G11: χ^2=4.92, *P*=.027). The proportion of *S mutans* CFUs were as also positively associated with increased prevalence of caries (χ^2=10.58, *P*=.001).

Conclusions: In this ongoing longitudinal study, the number and specific *S mutans* genotypes were significantly associated with caries in young children at baseline. Further characterization of the identified genotypes and their interaction with biological and behavioral characteristics associated with caries development will help to identify new strategies to prevent caries in children.

The Effect of Pre-treatment Fluoride on the Microleakage of Sealants. Duell E*, Udin R, Tanbonliong T. (The Herman Ostrow School of Dentistry of the University of Southern California, Los Angeles, CA)

Purpose: To evaluate the effect of varying pre-treatment topical fluoride application on microleakage of sealants.

Methods and materials: Sixty caries-free extracted human molars and premolars were assigned to one of four experimental pre-treatments groups: 4 minute application of 1.23% non-acidulated fluoride gel (Group 1); 1 minute application of 1.23% acidulated phosphate topical fluoride foam (Group 2); 2 minute application of 5 % NaF varnish (Group 3); standard sealant application only, no fluoride pre-treatment (Group 4). Teeth were then thoroughly pumiced and etched with 35% phosphoric acid for 15 seconds, rinsed, then a coat of PrimaryDry drying agent was applied. UltraSeal XT Plus sealant was placed on the occlusal surfaces of all teeth. All specimens were thermocycled and then immersed in 1% methylene blue. The teeth were rinsed thoroughly, embedded in acrylic and sectioned longitudinally. The specimens were examined under 10x magnification for dye penetration. Two scores were recorded for each sample, yielding a total of 120 surfaces examined. The margins were evaluated and scored according to the degree of dye penetration using a 0-4 scale (0=no dye penetration; 4=dye penetration surrounding the sealant). A Kruskal-Wallis test was used to compare dye penetration between the four treatment groups. A Mann-Whitney test was used to compare dye penetration between treatment pairs.

Results: There was a statistically significant difference in microleakage scores between the four groups tested (*P*<.001). There was no statistically significant difference in median microleakage scores between. Group 1 (*P*=.546) and Group 2 (*P*=.113) vs. Group 4. However, a statistically significant difference was found between Group 1, 2 and 4 versus Group 3 (*P*<.001).

Conclusion: The pre-treatment use of 1.23% non-acidulated fluoride gel and 1.23% APF foam have no effect on sealant microleakage. However, pre-treatment use of 5% sodium fluoride varnish resulted in significant sealant microleakage.

Pulpotomy Versus Pulpectomy for Vital Primary Incisors: Randomized Controlled Trial. Howley B*, Seale NS, McWhorter AG, Kerins C, Boozer K, Lindsey D (Baylor College of Dentistry, Dallas, TX)

Research supported by Baylor College of Dentistry Research Funds.

Purpose: Recommendations for primary tooth pulp therapy techniques do not differentiate between anterior and posterior teeth; however, anecdotal evidence suggests that practitioners provide pulpectomies in primary incisors with carious exposures, claiming "pulpotomies don't work in anterior teeth." The fiscal implications of this action require supportive evidence. The purpose of this prospective, randomized, splitmouth investigation was to compare success rates of formocresol pulpotomies (FC) and Vitapex pulpectomies (RCT) in asymptomatic vital primary incisors, where complete caries removal would result in pulp exposure.

Methods: Matched contra-lateral pairs of asymptomatic, carious, vital primary incisors, suitable for treatment with pulpotomy, were randomized to receive FC or RCT. Treatment was provided by 2 standardized operators, and all teeth were restored with SSCs. Seventy-four incisors in 25 patients were followed clinically and radiographically for up to 23 months. Radiographic findings were evaluated by two standardized and calibrated examiners, using separate pulpotomy and pulpectomy scales. (Modified Zurn/Seale).

Results: Incisors present at each interval (5-9; 10-14 and 15-23 months) showed no clinical signs of failure. Three incisors, lost early from pathological resorption, were counted as failures (2 FC, 1RCT). Though not significantly different, there were higher numbers of successful radiographic outcomes for FC than RCT at each observation interval. Cumulative final radiographic success was 89% (n=33) for FC and 73% (N=27) for RCT. (*P*>.11)

Conclusions: Anecdotal claims that pulpotomies are unsuccessful in primary incisors are unfounded. There was no significant difference in success rates of pulpotomies and pulpectomies in pulp treatment of asymptomatic vital primary incisors.

Long-term Effects of Childhood Antineoplastic Therapy on Oral Health. Hsieh SG*, Hibbert S, Arora M (Children's Hospital at Westmead, Westmead, NSW; Institute of Dental Research, Westmead, NSW; University of Sydney, Sydney, NSW)

Research supported by Australian Dental Research Foundation (25/2008).

Purpose: To examine the effect of childhood antineoplastic therapy on dental development, saliva function and caries prevalence.

Methods: Patients attending the long-term follow-up clinic at the Children's Hospital at Westmead were invited to participate in the study. Each participant underwent a

comprehensive dental examination and a paraffin-stimulated saliva test. The DMFT score was recorded and Holtta's Defect Index (HDI) was used to assess tooth aplasia, microdontia and root-crown ratio on an orthopantomogram. Multivariable-adjusted regression analyses were used to estimate the association of patient characteristics and treatment modalities with dental outcomes.

Results: One hundred and six participants (61% male) were recruited. The mean HDI score was 24.7±17.8, and mean scores were highest in patients treated between 3 and 5 years of age. Significant predictors of HDI scores included haematopoietic progenitor cell transplantation (HPCT; +19; $P<.0001$), total body irradiation (+16.8; $P<.01$), head and neck irradiation (+12.8; $P=.001$) and age at the start of treatment (+1.5; $P=.00001$). Exposure to the alkylating agent cyclophosphamide and HPCT increased the odds of having very low saliva flow by 6.5 ($P<.02$)and 4.4 times ($P<.05$) respectively. No substantial differences were observed in the DMFT scores between participants and an age-matched Australian cohort, and no significant association could be observed between the DMFT scores and any treatment variable.

Conclusions: Children and adolescents exposed to HPCT, head and neck irradiation, TBI, high doses of cyclophosphamide or treatment at a younger age were at increased risk of dental disturbances. HPCT and cyclophosphamide also increased the risk of hyposalivation.

Comparison of MTA and DFC in Pulpotomized Human Primary Molars. Sushynski JM*, Botero TM, Boynton JR, Majewski RF, Hu JCC (University of Michigan Ann Arbor, MI; Mott Children Health Center, Hurley Medical Hospital, Flint, MI)

Research supported by Michigan Institute for Clinical & Health Research.

Purpose: This prospective, randomized, controlled, clinical trial assessed the 2-year clinical and radiographic outcomes of diluted formocresol (DFC) compared to gray mineral trioxide aggregate (GMTA) for primary molar pulpotomy.

Methods: Determined by power analysis, 252 molars of 152 children were randomly assigned to the GMTA (119 teeth) or DFC (133 teeth) group. Following removal of the coronal pulp and hemostasis, the pulp stumps were covered with GMTA in the experimental group and DFC in the control group. Pulp chamber was filled with IRM and teeth were restored with stainless steel crowns. Radiographs taken at each 6-month follow-up appointment were digitized for analysis. Clinical status of each treated tooth was determined at each follow-up appointment. Three blinded and calibrated examiners scored each radiograph for signs of pathology.

Results: A total of 694 clinical and radiographic evaluations were analyzed. Gender, study site, arch type, and tooth type did not influence the treatment outcome at all time points. Only at 24-month and the combined 6- to 24-month follow-up, clinical success of DFC was significantly lower than that of the GMTA ($P=.04$). Radiographically, a statistically significant difference in success rate was demonstrated between the GMTA and DFC group at all time points ($P<.01$). Dentinal bridge formation was observed at a significantly higher frequency among the GMTA treated molars ($P<.01$); while internal root resorption was observed at a significantly higher frequency in the DFC treated molars ($P<.01$).

Conclusions: At 2-year follow-up, GMTA group demonstrated significantly better clinical and radiographic outcomes when compared to DFC group.

Parents' Interpretation of Instructions to Control Fluoride Toothpaste Application. Thomas AS*, Huebner CE, Lin S (University of Washington, Seattle, WA)

Research supported by Project #T76 MC 00011 from the Maternal and Child Health Bureau (Title V, Social Security Act), Health Resources and Services Administration, US Department of Health and Human Services.

Purpose: This study determined average amounts of fluoridated toothpaste applied by parents to a child's toothbrush in response to instructions to limit the quantity to a "smear" or "pea-sized" amount.

Methods: Fifty parents of children (12-71 months), sampled from a university-based pediatric dentistry clinic, participated. The majority of children (83%) were covered by Medicaid insurance; 16% had private insurance. Parents were presented with 3 identical, pre-weighed child's toothbrushes, one at a time, and asked to apply the amount of toothpaste instructed. With the first toothbrush, all were asked to demonstrate the amount of toothpaste they typically use with their child. The order of instructions was balanced such that half were asked to apply a "smear" and then a "pea" and vice versa. The toothbrushes were bagged to be weighed at a later time. Last, participants were shown established amounts corresponding to a smear and a pea (0.125 g and 0.25 g, respectively) and asked to recommend alternate labels for each. Comparisons were analyzed using a *t*-test ($P<.05$).

Results: Mean quantity applied in response to "smear" was 0.214 g (SD=0.187 g) vs. 0.125 g ($P=.002$); the mean quantity in response to "pea" was 0.299 g (SD = 0.210 g) vs. 0.25 g ($P=.10$). Parents' typical amount weighed on average 0.334 g (SD=0.237 g).

Conclusions: Most parents are not aware of the amount of fluoridated toothpaste recommended for young children. This study supports education and demonstration of "smear" and "pea-sized" amounts of fluoridated toothpaste within dental practices.

Characterizing the Relationship between Obesity and Periodontal Disease in Adolescents. Uston KA*, Taylor GW, Boynton JR, Kinney JS, Richards PS, Yang YJ (University of Michigan, Ann Arbor, MI; Mott Children's Health Center, Hurley Medical Center, Flint, MI)

Research supported by the Colgate-Palmolive Company, Delta Dental Master's Thesis Award, and Rackham Student Research Grant.

Purpose: To assess the relationship between periodontal disease (Pdz) and obesity, and to evaluate the related salivary host-response biomarkers in adolescents.

Methods: There were 162 adolescent participants (87 female, 75 male) 13- to 18-years-old in this observational cross-sectional clinical study. Data collection included: a periodontal examination, questionnaire, body mass index (BMI), waist circumference, whole saliva sample, and radiographs. Salivary biomarkers were analyzed via custom antibody arrays. Pdz was defined by probing pocket depth and bleeding on probing, radiographic bone loss, or gingival recession.

Results: Participants were classified by BMI as: underweight 6(4%), healthy weight 87(54%), overweight 25 (15%), and obese 44(27%). The 13-year-old group was the largest with 38(24%) participants, and while the 18-year-old group was the smallest with 11(7%), it had the highest Pdz prevalence (64%). According to the Pdz case definition, 56(35%) participants had Pdz. Overall, the BMI category and Pdz were not statistically significantly associated. The largest prevalence of Pdz by BMI category was underweight (67%- 4 out of 6), and the second largest prevalence was obese (39%-17 out of 44). The majority of participants (123 [76%]) had cotinine levels indicative of passive or active smoke exposure. Interleukin-1β, matrix metalloproteinase-8, and matrix metalloproteinase-9 showed higher median values for participants classified as both being obese and having Pdz (*P* values=.089; .039; and .024, respectively).

Conclusions: Obesity was not significantly associated with a greater likelihood of having poorer periodontal health in this study-group. However, individuals simultaneously positive for Pdz and obesity exhibited the greatest inflammatory and degradative activity in biomarker levels.

2011 3M ESPE Preventative Pediatric Dentistry Postdoctoral Research Fellowship Abstracts

Up to 3 pediatric dentistry students/residents are selected for the 3M ESPE Preventative Pediatric Dentistry Postdoctoral Research Fellowship, based on proposal submissions. Recipients conduct a yearlong research fellowship and present their research at the AAPD 2011 Annual Session. The following research abstracts will be presented:

Caregivers' Perceptions on Changing Parenting Styles. Bridgers SL*, Milano M, Stein M, and Lee JY (School of Dentistry at the University of North Carolina at Chapel Hill, Chapel Hill, NC)

Research supported by 3M ESPE.

Purpose: The purpose of this study was to characterize parenting styles of caregivers that present to a pediatric dental clinic, to assess parents perceived changes in parenting styles and to explore the relationship between parenting styles and children's behavior in a pediatric dental setting.

Methods: We used a survey instrument that was developed using questions adopted from the National Longitudinal Survey of Children and Youths as well as validated items from a pilot study. Surveys were given to caregiver-child dyads who met inclusion criteria. Inclusion criteria for caregivers included only biological mothers of children who have been legal guardians for the child's entire life. Caregivers had to be able to read, speak and understand English. Children included in this study were healthy (ASA I and II), less than 12 years of age and presented to the UNC Pediatric Graduate Dental Clinic for an initial clinical exam. Our major explanatory variables were the caregiver's parenting styles and sociodemographic information. Our major outcome variable was child behavior as measured by the modified Frankl Behavior Rating Scale.

Results: 104 surveys were completed and all respondents were the biological mothers of the children in this study. The majority of respondents were Caucasian women (52.9%) with a two year college degree or more (65.4%), married (53.9%) with 99% of children living in their household full-time. The majority of children were male (55.8%), Caucasian (58.7 %) and mostly enrolled in public school or not currently enrolled in school. The mean age for parents was 31.8 years and for children was 4.5 years. Nearly all (94.2%) of mothers believe that parenting trends have changed since they were children. Over 70% of mothers report that parenting is more difficult now than when they were children. Reasons for increased difficulty of parenting included stress, single parent home, working full-time and divorce. Approximately 67% of children demonstrated cooperative or definitely cooperative behavior at their dental visit while 32.7% of children demonstrated uncooperative or definitely uncooperative behavior. Children with other insurance were approximately three times more likely (OR 2.95) to be cooperative than those who were Medicaid recipients and older children were significantly more likely (OR=1.48) to be cooperative. No relationship was found between parenting style and child behavior in a dental setting.

Conclusion: Caregivers today report increased difficulty in parenting children and this may impact a child's behavior in the dental setting.

Dentists' Antibiotic Prescribing Practices for Treating Dental Infections in Children. Cherry III WR*, Lee JY, Shugars DA, White RP, Vann Jr. WF (School of Dentistry at the University of North Carolina at Chapel Hill, Chapel Hill, NC)

Research supported by 3M ESPE.

Purpose: To examine the antibiotic prescribing practices of general and pediatric dentists for the management of odontogenic infections in children.

Methods: We relied upon a cross-sectional study design to assess the antibiotic prescribing practices of general and pediatric dentists in North Carolina. Survey development was completed in 3 phases: 1) expert panel review 2) recorded and transcribed semi-structured interviews, and 3) piloting-testing. The final instrument consisted of 5 clinical case scenarios that included antibiotic-prescribing decisions in a self-completed questionnaire consisting of Likert-type responses. Participants were volunteers attending one of four continuing education courses. Responses for each clinical case scenario were compared to the guidelines for prescribing antibiotics provided by the American Academy of Pediatric Dentistry and the American Dental Association.

Results: The sample included 153 surveys (response rate: 55%). Of respondents, 67% (N=103) were general practitioners and 31% (N=48) were pediatric dentists. Antibiotics most commonly prescribed included Amoxicillin—67% (N=103) and Penicillin—31% (N=47). The frequency of prescribing antibiotics for odontogenic infections was daily—7% (N=11), weekly—34% (N=41), monthly— 33% (N=51), or hardly ever—33% (N=50). For the 3 in-office case scenarios, adherence to guidelines was as follows: 11%, 26%, and 32%, respectively. For the 2 after-hours case scenarios, adherence dropped to 15% and17%, respectively. Dentists who had completed post-graduate training were more likely ($P<.05$) to adhere to guidelines. No statistical difference was found between general and pediatric dentists.

Conclusions: Adherence to professional guidelines for prescribing antibiotics for odontogenic infections in children was extremely low.

Effect of Xylitol-Wipe on Mutans Streptococci Xylitol-Resistance and Biofilm Formation. Lo J*, Featherstone JDB, DenBesten P, Hoover CI, Huynh T, Zhan L (University of California, San Francisco, CA)

Research supported by 3M ESPE.

Purpose: In a randomized clinical trial, we found a significant reduction of new caries in young children with daily use of xylitol-wipes over one year without reduction on mutans streptococci (MS) levels. The purpose of this study was to determine whether the effect of xylitol was due to selection of xylitol-resistant MS, and/or altered biofilm formation ability of MS.

Methods: Unique MS genotypes were isolated from the xylitol-wipe group and the placebo-wipe group at baseline and at 1 year. These isolates were examined for their xylitol sensitivity and ability to form biofilm in the presence of sucrose. Xylitol sensitivity was determined by comparing bacterial growth curves in TPY glucose broth with or without the addition of 1% xylitol. Sucrose dependent biofilm formation of each genotype was quantified using crystal violet assay.

Results: At one year, there was no significant difference in prevalence of xylitol-resistant MS genotypes between the xylitol-wipe and the placebo-wipe groups. In addition, there were no statistical significant differences in biofilm formation of MS isolated from the two wipe groups at baseline or one year ($P>0.05$).

Conclusion: This prospective randomized clinic trial has shown no correlation between caries reduction and selection of xylitol-resistant MS. Furthermore, xylitol-wipe use did not alter the ability of MS to form biofilm. Further studies are needed to identify other possible mechanisms of caries prevention resulting from the use of xylitol-wipes in children.

Acknowledgment: Research supported by the 2010-11 3M ESPE Preventative Pediatric Dentistry Postdoctoral Research Fellowship.