



University of Pittsburgh
School of Dental Medicine

Spring Research Symposium

Tuesday, April 13, 2004
9:00 am - 1:00 pm
Room 458 Salk Hall

**UNIVERSITY OF PITTSBURGH
SCHOOL OF DENTAL MEDICINE**

Spring Research Symposium

Tuesday, April 13, 2004

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School of Dental Medicine
Spring Research Symposium
Tuesday, April 13, 2004

12:00-12:15 Room 457
Welcome, Dr. Thomas Braun, Dean

12:15-1:00 Buffet Lunch

Symposium Presentations: Room 458

1:00-1:10 Introduction, Dr. Mary L. Marazita, Associate Dean for Research

Invited Speaker

1:10-2:10 Introduction by Dr. Charles Sfeir
Dr. Arthur Veis, Northwestern University
Relationship between Amelogenesis and Odontogenesis during Tooth Maturation

Dean's Summer Research Scholarship Program, 2003

2:15-2:45 Introduction – Dr. Mark Mooney

Yu-Tien Lin, 1st Year, Dr. Charles Sfeir, Mentor
Amelogenin Splice Products Regulate Gene Expression in Mineralized Cells

Alex Antoniu, 1st Year, Dr. Heiko Spallek, Mentor
Development of a Formative Evaluation Method for an Adaptive Hypermedia Course

Ryan Tyng, 1st Year, Dr. Nina Markovic and Margaret Kruder Hamilton, Mentors
An Analysis on the Treatment of Dentists in Film and News Media

Student Research Awards Presentations

2:45-3:15 Dr. Mark Mooney, Dr. Kenneth Etzel

ASDA Awards	-	President, Beth Troy, 3 rd
Student Clinician Awards	-	Mr. Ronald Rink, Dentsply
Penhall Clinical Awards	-	Dr. O. Jack Penhall

Student Research and Faculty Presentations

3:15-3:30 Jeffrey Hazon, 4th Yr
T-35 Short-Term Dental Student Research Training Program
Guided Tissue Regeneration using Osteoinductive Polyurethane Membranes in Rabbit Maxillary Osteotomies

- 3:30-3:45 Dr. Brion Maher, Genetics
*A Preliminary Investigation of the Relationship between Attention Deficit
Hyperactivity Disorder and Dental Caries*
- 3:45-4:00 Dr. Charles Sfeir, Oral Biology
*Phosphoryn –exon5 of DMP3- Regulates Osteoblast Gene Expression and
Mineralization*
- 4:15-4:30 Dr. James Sciote, Orthodontics
Myosin: Evolution, Physiology and Orthodontics
- 4:30-4:45 Dr. Mary Marazita, Genetics
Meta-analysis of Genome Scan Data for Cleft Lip with or without Cleft Palate
-

4:45 Room 403, Poster & Interactions – Refreshments

Invited Speaker

Arthur Veis, Ph.D.

Department of Cell and Molecular Biology

**Northwestern University Medical School
Chicago, Illinois**

Relationships between Amelogenesis and Odontogenesis during Tooth Maturation.

The principal functions of the extracellular matrices of mineralized tissues have been related to their role in regulating the deposition of the mineral phases. Amelogenins regulate deposition of the large enamel crystals and the DMPs regulate the formation of the smaller crystals of hydroxyapatite in dentin. It is now becoming clear that the amelogenins and DMPs also regulate cellular behavior in both dentin and enamel during tooth maturation. The current work on this new aspect of epithelial-mesenchymal cell cross talk and its implications for proper tooth maturation will be examined.

Abstracts on the following Pages are associated with the meetings listed below:

Abbreviation	Dates	Title	City
AAOMP	May 17-21, 2003	American Academy of Oral and Maxillofacial Pathology	Banff, Canada
AAOMP	May 8-12, 2004	American Academy of Oral and Maxillofacial Pathology	Charleston, SC
ACPA	March 15-20, 2004	American Cleft Palate-Craniofacial Association	Chicago, IL
ADEA	March 6-9, 2004	American Dental Education Association	Seattle, WA
APS	March 3-6, 2004	American Psychosomatic Society	Orlando, FL
ASHG	November 4-8, 2003	American Society of Human Genetics	Los Angeles, CA
ATS	May 21-26, 2004	100 th International Conference of the American Thoracic Society	Orlando, FL
DIDR	June 12-13, 2003	Dental Informatics and Dental Research Conference	Pittsburgh, PA
IADR/AADR	April 5-9, 2000	International Association for Dental Research	Washington, DC
IADR	June 25-28, 2003	81 st General Session & Exhibition of the Int'l Association for Dental Research	Göteborg, Sweden
IADR/AADR/CADR	March 10-13, 2004	82 nd General Session	Honolulu, HI
IAOMS	May 13-20, 2003	International Conference on Oral and Maxillofacial Surgery	Athens, Greece
IASD	June 18-21, 2003	International Academy for Sports Dentistry	San Juan, Puerto Rico
PBS	August 20-23, 2003	Pittsburgh Bone Symposium	Pittsburgh, PA
ORS	March 10-14, 2004	Orthopaedic Research Society	San Francisco, CA
SCG	November 3, 2003	Society of Craniofacial Genetics	Los Angeles, CA
USCAP	March 22-28, 2003	United States and Canadian Academy of Pathology	Washington, DC

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Development of a Formative Evaluation Method for an Adaptive Hypermedia Course

Antoniou, A.G., Spallek, H.

Traditional online dental education courses cannot take individual learner characteristics into account. Adaptive hypermedia (AH) is an emerging research direction focusing on systems which try to overcome the problem that users with different goals and knowledge may be interested in different pieces of information presented about a topic. A newly developed course, "Information Retrieval for Dental Professionals", exploits these concepts in order to make learning more efficient and effective.

This presentation reports about the development of a 4-stage formative evaluation process.

Stage 1: Several task-oriented cognitive walk-throughs were planned and executed, with users not involved in development, in order to solve anticipated problems before bringing the course to users for testing.

Stage 2: Critical reviews of the course were solicited via email from Web design experts and educational software design experts. After completing the course, they returned unstructured informal feedback about their general impression as well as a list of any discovered deficiencies.

Stage 3: An expert review model was designed using a general heuristic for user interface design and the ANSI standard "Guidelines for the Design of Education Software." Reviews were collected from education and dental/health science experts.

Stage 4: In order to evaluate the efficiency and effectiveness of the new learning environment a pre- and post-course questionnaire will be matched with learning outcomes in the electronic environment itself. Three target populations will be used for this purpose: first year dental students, third and fourth year students, dental practitioners in the Pittsburgh area, and dental faculty at the School of Dental Medicine. Stage four is now ongoing with the approval of the IRB.

Bezak, Theresa C.

Poster, ADEA

Recruitment and Retention of Underrepresented Population Groups in Dental Hygiene

BEZAK, T.C. and ETZEL, K.R. University of Pittsburgh, School of Dental Medicine, Dental Hygiene Program

Purpose: The researcher tried to identify how many students of underrepresented population groups complete their dental hygiene program and to determine factors of those who do not complete. Additionally identified were methods being utilized for recruitment and retention.

Abstract: The US Surgeon General's Report (2000) states that underrepresented population groups (UPG's) are unable to obtain much needed oral healthcare due in part to the minimal number of minority healthcare professionals. These UPG's include poor children, the elderly and a large number of ethnic and racial minority groups. Research further states that patients generally go to medical professionals of similar race and ethnicity as themselves. Research suggests that if there is an increase in the number of healthcare professionals from these UPG's then access to oral healthcare will be increased. This research reflects a national survey of dental hygiene programs' recruitment and retention efforts of UPG's.

Methods: A questionnaire was developed to address the reasons for non-retention and recruitment and mentoring strategies. A 10 item survey was mailed to 265 accredited entry-level dental hygiene program directors in May of 2003. Analysis includes identification of recruitment programs, mentoring strategies, retention rates of UPG students and reasons for non-completion. Also this research will differentiate in proportions the predictor groups and retention.

Results: The results of this US entry-level dental hygiene programs survey respondents thus far (currently 18%) indicate that 1) UPG students have a lower retention rate than Non-UPG students, 88.6% of all UPG students complete the program while 93.1% of Non-UPG group students complete; 2) there is a significant relationship between UPG student drop-out rate and finances, 67.3% dropped out due to financial concerns; 3) of all UPG students 33% dropped out due to other reasons; 12.3% were unable to continue due to academic or professional performance; 7.5% dropped out due to family concerns; and 4) recruitment strategies and retention/mentoring programs are not specifically designed for UPG's.

Conclusion: Overall, there is a lack of recruitment and mentoring programs specifically designed for UPG students and there is a great need for increased financial support to reduce their drop-out rate.

Evidence of Unique Dermatoglyphic Phenotypes in Nail Patella Syndrome (NPS)

BRANDON, C.A.¹, SCOTT, N.M.¹, NEISWANGER, K.¹, WEINBERG, S.M.¹, BARDI, K.M.¹, TOWERS, A.L.², MARAZITA, M.L.¹ 1) Center for Craniofacial and Dental Genetics, School of Dental Med Univ of Pittsburgh 2) Div Geriatric Med, Univ of Pittsburgh

NPS is a rare genetic disease (22/1,000,000) due to mutations in the LMX1B gene, which has been shown to play a major role in dorsoventral patterning and limb development. NPS often affects the distal limb; clinical features include nail dysplasia, triangular lunulae, and loss of skin creases over the distal interphalangeal joints. Abnormal dermatoglyphics have been reported in a number of genetic syndromes affecting the distal limb, however the dermatoglyphics of NPS have never been characterized. Therefore, we investigated dermatoglyphic data from 29 NPS cases, ascertained at the Fifth International Symposium on Nail Patella Syndrome (sponsored by Nail Patella Syndrome Worldwide). Pattern types were analyzed by three independent raters and were categorized into ulnar loop, radial loop, whorl, or arch. Approximately 3% of the fingerprint patterns observed in the NPS cases were unique and therefore categorized as "other". Control pattern data was obtained from the literature (n= 720). The frequency of arches was significantly increased in affected individuals compared to controls (16.1% vs 4.7 %, $p < 0.0001$) while ulnar loops and radial loops were significantly decreased ($p=0.01$ and $p=0.01$, respectively). Affected males had more whorls ($p=0.006$) and arches ($p < 0.001$), and fewer ulnar loops ($p < 0.0001$) than controls. Affected females also had more arches ($p < 0.0001$), and fewer ulnar loops ($p < 0.0001$) than controls, but fewer whorls ($p=0.01$). Interestingly, as is seen in the general population, females with NPS have more ulnar loops than males ($p < 0.0001$), and males have more whorls than females ($p < 0.0001$). This is the first study of dermatoglyphic patterns in NPS. Our results clearly demonstrate the impact of the LMX1B gene on the dermatoglyphic phenotype of individuals with NPS, specifically resulting in an increase in arches, ulnar loops and unique patterns. Supported by NIH grant DE-13076.

American Journal of Human Genetics 73(supplement):286, 2003.

Longitudinal Analysis of Heritability Estimates of Dental Caries Traits

BRETZ, W.A.¹, CORBY, P.M.¹, ROBINSON, M.², SCHORK, N.², COELHO, M.³, COSTA, S.³, WEYANT, R.J.¹, HART, T.C.¹, MARAZITA, M.L.¹, and MELO FILHO, M.³, ¹University of Pittsburgh, PA, USA, ²University of California-San Diego, USA, ³UNIMONTES, Monte Claros, Brazil

Objective: To determine heritability estimates of changes in dental caries progression/remission in two examinations one year apart.

Methods: Dental caries examinations were performed on 315 pairs of twins 1.5 to 8 years old from the city of Montes Claros, Brazil. Genotyping 8 polymorphic DNA markers determined zygosity. Twins had their teeth cleaned prior to exam. Caries exams followed NIDCR criteria modified to distinguish white spot lesions from cavitated lesions. Surface-based caries prevalence rates (SBCPR) were computed. The severity of the lesion was also determined (1-white spot; 2- initial enamel; 3- initial dentine; 4- >2-3mm into dentine) yielding the Lesion Severity Index (LSI)= number of lesions adjusted by their severity rank. Heritability analyses were performed using the SOLAR software package. Heritability was treated in its narrow sense as the contribution of additive genetic factors on phenotypic expression. Likelihood ratio statistics were computed to assess the contribution of covariates (age, gender) to variation for each phenotype.

Results: Heritability estimates (delta change overtime) for overall SBCPRs and for the LSI were $H=44.6$ ($p < 0.0000$) and $H=49.6$ ($p < 0.0000$), respectively. Incipient lesions and enamel/dentine collapse showed low heritability (range of $H=1.3$ to 23.6). Deep dentinal lesions however had moderate heritability ($H=44.7$, $p < 0.0001$). SBCPRs for the mesial and occlusal surfaces had the highest heritability (Mes $H=48.2$ and Occl $H=56.7$).

Conclusions: These results indicate that dental caries progression/remission has a significant genetic contribution over time. This study was partially supported by NIH/NIDCR grants DE13534 and DE014528

web-J Dent Res: Abstract #3458 (2004)

Comparison of Dental Caries Exams and DIAGNOdent in Primary Teeth

BRETZ, W.A.¹, CORBY, P.M.¹, BARTLING, W.¹, KIM, J.¹, COELHO, M.², COSTA, S.² and WEYANT, R.J.¹,
¹University of Pittsburgh, PA, USA, ²UNIMONTES, Monte Carlos, Brazil

Objective: To determine the correlation between methods of caries diagnosis: visual inspection, visual inspection plus bite-wing radiographs and infra-red laser fluorescence (IRLF).

Methods: 322 pairs of twins aged 18 months to seven years were enrolled for the study. Two examiners examined all primary molars. NIDCR caries index was modified to assign scores for the clinical exam: 1-white spot lesions; 2-lesions confined to enamel with loss of intact surface; 3-lesions with visible dentin breakdown; 4-lesions 2-3mm into dentin. The IRLF (DIAGNOdent, KAVO, Biberach/Rib, Germany) measurements were performed on the fissures and readings were indexed based on the instrument output: 0 = 0-9 output; 1 = 10-17; 2 = 18-99. Examiner one performed the clinical exam on one twin while examiner two performed IRLF on same twin. Examiner's tasks were reversed for the second twin. Reliability (Cronbach's α) was calculated between lesion severity with and without bite-wings and IRLF output.

Results: Visual and radiographic exam showed high correlations for the molar teeth ($\alpha = 0.94 - 0.97$). Visual inspection with IRLF showed lower correlation ($\alpha = 0.57 - 0.73$). Correlation was similar when visual inspection plus radiographic exams revealed the presence of an incipient lesion and the IRLF had an output of 0 to 9.

Conclusion: Correlations between IRLF and visual inspection and/or radiographic examination were lower than correlations between visual inspection and radiographic exams. This study was partially supported by NIH/NIDCR grants DE13534 and DE014528.

web-J Dent Res: Abstract #2813 (2004)

Dental Caries and Microbial Acid Production in Twins

BRETZ, W.A., CORBY, P.M.¹, ROBINSON, M.², SCHORK, N.², COELHO, M.³, COSTA, S.³, WEYANT, R.J.¹, MOREIRA, G.³, and TAVARES, V.³, ¹ University of Pittsburgh, PA, USA, ² University of California-San Diego, USA, ³ UNIMONTES, Monte Claros, Brazil

Objective: To determine the relative contribution of gene-environment interactions on dental caries traits and microbial acid production in a twin model.

Methods: Dental caries examinations and microbial acid production assays (CLINPRO™, 3M ESPE, Germany) were performed on 394 pairs of twins 1.5 to 8 years old from the city of Montes Claros, Brazil. Genotyping 8 polymorphic DNA markers determined zygosity. Twins had their teeth cleaned prior to exam. Caries exams followed NIDCR criteria modified to distinguish white spot lesions from cavitated lesions. Surface-based caries prevalence rates (SBCPR) were computed. Samples were collected from the tongue using a lactic acid indicator swab. Assay scores were categorized based on acid formation as 1=low, 2=medium, and 3=high. Heritability analyses were performed using the SOLAR software package. Heritability was treated in its narrow sense as the contribution of additive genetic factors on phenotypic expression. Likelihood ratio statistics were computed to assess the contribution of covariates (age, gender) to variation in each collected phenotype as well as to test for differences in heritability.

Results: Heritability estimates for SBCPRs and for microbial acid production were $H=76.5$ ($p<.0000$) and $H=16.2$ ($p=.0078$), respectively. Treating microbial acid production as a covariate in the SBCPR model did not change the heritability estimate, i.e. $H=76.3$ ($p<.0000$).

Conclusions: These results suggest that dental caries surface traits have a significant genetic contribution and that microbial acid production is modulated by the environment. This study was partially supported by NIH/NIDCR grants DE13534 and DE014528

web-J Dent Res: Abstract #3457 (2004)

An Analysis of Pre-Clinical Preparations for Fixed Partial Dentures

CARNAGGIO, T.V., PIPER, J.M., II², ACOSTA, H.², ISMAIL, Y.³, MCCARTHY, E.², CLOSE, J.², and YOUNG, W.², ¹ University of Pittsburgh, School of Dental Medicine, PA, USA, ² University of Pittsburgh, PA, USA, ³ University of Pittsburgh, PA

Objectives: The optimal degree of taper for crown preparations should approach parallel axial walls. This is fundamentally unattainable as some degree of convergence is necessary to allow the seating of crowns on their corresponding dies and/or teeth. Most authors recommended a 3°-6° taper or 6°-12° convergence angle. These convergence angles advocated by the experts are extremely difficult to achieve under clinical, as well as clinically-simulated conditions. Accordingly, the present study was conducted to investigate the ability of dental students to achieve the advocated crown preparation guidelines for convergence angles.

Methods: Eighty-eight tooth preparations were completed on typodont teeth, by second-year dental students under proficiency testing conditions. A modified projector was used to reflect a shadow of tooth preparations onto a glass window apparatus from a distance of 36 inches. The images were traced onto clear paper, placed behind the glass window. The convergence angles were extended and measured with protractors. A 2 x 2 within cases ANOVA was used to test for mean convergence angle differences between teeth and location.

Results: Results indicated convergence angles between -3° and 39° with a mean of 15.5° for tooth #4. For tooth #6 the convergence angles ranged between -4° and 51° with a mean of 20.7°. A highly significant tooth by location interaction was found ($P \leq .0004$). Tests for simple main effects found that MD and BL angles did not differ significantly on tooth #4, nor did tooth #4 significantly differ from tooth #6 on MD angle ($P = .745$). However, highly significant differences were found between MD and BL angles on tooth #6 ($P \leq .0004$).

Conclusion: It was concluded that second-year students could not complete crown preparations within the 6°-12° criteria. Therefore, we recommended that a more realistic criterion should be established for the convergence and taper angles of crown preparations.

web-J Dent Res: Abstract #0426 (2004)

Heritability of Developmental Enamel Defects in Primary Teeth

CORBY, P.M., BRETZ, W.A.², ROBINSON, M.³, SCHORK, N.³, COELHO, M.⁴, COSTA, S.⁴, WEYANT, R.J.², and HART, T.C.², ¹ Harvard University, MA, University of Pittsburgh, Pittsburgh, PA, USA, ² University of Pittsburgh, PA, USA, ³ University of California-San Diego, USA, ⁴ UNIMONTES, Monte Claros, Brazil

Objective: To determine the prevalence and heritability of enamel opacity and enamel hypoplasia in twins.

Methods: Enamel defects' examinations were performed on 394 pairs of twins 1.5 to 8 years old ascertained from a government-based registry in the city of Montes Claros, Brazil. Genotyping 8 polymorphic DNA markers determined zygosity. Twins had their teeth cleaned prior to exam. Criteria for detection of enamel defects were as follows: 1) enamel hypoplasia - a break in continuity of the enamel, reducing its thickness and giving rise to a variety of pits and grooves; 2) enamel opacities- a change in translucency of enamel, with white or discolored areas being detectable. Participants were categorized as affected (at least one defect) or non-affected. Heritability analyses were pursued using the suite of genetic analysis modules in the SOLAR computer software package. Heritability was treated in its narrow sense as the contribution of additive genetic factors on phenotypic expression. SOLAR was run to accommodate the analysis of covariates such as age and gender.

Results: The prevalence and heritability estimates of enamel opacities and hypoplasia were, respectively, 7.6%- $H=74.8$ ($p < .0000$) and 4.1%- $H=82.3$ ($p < .0000$).

Conclusion: These results suggest that developmental enamel defects' variation in the primary dentition is significantly explained by familial aggregation. This study was partially supported by NIH/NIDCR grants DE13534 and DE014528

web-J Dent Res: Abstract #0781 (2004)

Cardiovascular Risk Evaluation of Families in a Rural WV Population

CROUT, R., MCNEIL, D.W., WENGER, S., WEARDEN, S., WEYANT, R.J. WVU SoD, SoM; University of Pittsburgh, Sch Dent Med

West Virginia leads the nation in mortality from coronary heart disease (CHD) among men and women age 35-74 (D. Sturgill et al. WV Med J 1990 Jan:86(1):9-11). An evaluation of selected risk factors was performed on 60 families in two rural WV counties. The burden of oral disease, suggested as a possible CHD risk factor by the recent Surgeon General's Report, has been reported in this population previously (W. Bretz et al. J Public Health Dent 2001, 6(1): 231). Objectives: The purpose of this study is to report on the prevalence of high serum cholesterol and glucose levels in this same population. The families consisted of 132 participants of whom 55 were children and 77 adults. With the exception of 5 individuals who had no other family members, all participating families had at least one parent and one biological child. Methods: 5ccs of blood was drawn, placed in a serum separator tube, spun at chair side in a centrifuge at 3000 rpm for 15 minutes, and then transported to a commercial laboratory. Upon arrival, the serum was run on an Olympus 5000 instrument. The laboratory's abnormal levels for glucose were > than 109 mg/dl, and for cholesterol > 200 mg/dl. Results: Of the participants, 40.9% (with a 95% confidence interval of ± 8.4) had elevated cholesterol and 13.6% (± 5.8) had elevated glucose. Of the children, 12.7% had high glucose while an additional 12.7% had elevated cholesterol levels. Among their parents, 63.1% had high cholesterol, 36.8% had elevated glucose, and 10.5% exhibited both increased levels of cholesterol and glucose. In 4 of 39 families, both parents and children had elevated cholesterol while one family had both a parent and child with elevated glucose. Conclusions: Further evaluation of cholesterol and glucose determinations on this population would seem warranted and if confirmed, intervention strategies considered.

web-J Dent Res: Abstract #2040 (2003)

Do You Practice What You Preach?

DECARIA, A., CLOSE, J.M., ETZEL, K.R.

Purpose: To determine the degree to which students incorporate nutrition information into their lifestyle and to determine if differences exist between two health science schools regarding lifestyle choices. The role of nutrition in the maintenance of oral and overall health is receiving greater emphasis in the dental curriculum. Despite the fact that students are presented with dietary information, the degree to which it is utilized on a daily basis is uncertain. A 27-item survey was distributed to faculty and students in the School of Pharmacy (PS) and the School of Dental Medicine (DS) at the University of Pittsburgh. In addition to faculty, students from the First professional and Dental Hygiene programs were included in the Dental medicine survey. The questions pertained to dietary and oral hygiene habits that are associated with optimal oral and systemic health. Two hundred and seventy-one dental/hygiene students and faculty and 104 pharmacy students and faculty responded to the survey. Results of the survey reveal that, in general, those habits associated with optimal oral health care are practiced more consistently by dental students compared to their pharmacy counterparts: brushing between meals, DS=33.6 percent, PS=15.4 percent ($p=.0008$); daily flossing, DS=53.1 percent, PS=22.1 percent ($p=.0004$); mouth rinsing, DS=37.3 percent; PS=30.8 percent ($p=.2923$). Dietary choices that have a negative impact on oral health are more likely to be practiced by pharmacy students compared to dental students: carbonated beverages: DS=42.8 percent, PS=54.8 percent ($p=.0498$); sugared gum chewing, DS=14.8 percent, PS=31.7 percent ($p=.0005$).

These results suggest that nutritional information is utilized by students in their daily lives and suggests that presentation of this information in the curricula of other health professions would be beneficial.

C-Reactive Protein and Periodontal Disease in Type 1 Diabetic Patients

Delie, R.A., Close, J.M., Corby, P.M., Suzuki, J.B. and Moore, P.A.; University of Pittsburgh School of Dental Medicine

Objective: To describe the relationship between serum CRP values and periodontal disease status in an adult population of Type 1 diabetic patients while adjusting for demographic, behavioral, and medical confounding factors.

Methods: The study population included 132 Type 1 diabetic subjects (75 males and 56 females) with a mean age of 36.2 years. Periodontal measurements assessed pocket depth and attachment levels using a standard CPITN pressure controlled probe at buccal sites of each tooth on two randomly assigned quadrants (excluding third molars). Bleeding was assessed with the CPITN probe at 2 mm into the gingival sulcus. Smoking history and alcohol consumption were included in the initial oral health questionnaire. A medical evaluation for diabetic complications was completed. Body mass index was calculated and blood samples assessed total glycated hemoglobin (HbA1) and serum high sensitivity CRP.

Results: The mean CRP was 1.64 mg/l (± 1.24). The Spearman rank-correlation of CRP showed a positive correlation for pocket depth groups ≥ 3 mm and ≥ 4 mm (% of sites measured). Additionally, greatest amount of attachment loss per subject and smoking history was positively correlated. No other dependent variables or confounding variables reached significance. No significant results were found with the log transformed CRP values in the Pearson correlations. A stepwise, backward elimination multiple regression analysis showed significance for the percentage of bleeding teeth per subject and positively correlated with log transformed CRP. The adjusted r square represents a significant but weak relation of the bleeding measure and log CRP.

Conclusions: In a Type 1 diabetic subpopulation, the percentage of teeth with bleeding on probing per subject was positively correlated with log transformed CRP values. In a Spearman bivariate analysis with CRP values, smoking, PD ≥ 3 , PD ≥ 4 , and deepest attachment loss were positively correlated. Supported by NIH grants DE13668, DE14472, DK34818 and K23 DE00453

web-J Dent Res: Abstract #3746 (2004)

The Relationship Between Periodontal Disease Tooth Loss and Rate of Bone Loss in Older Women

FAMILI, P., and CAULEY, J., University of Pittsburgh, USA

Objectives: The objective of the present study was to evaluate the association between changes in bone mineral density (BMD) and clinical signs of periodontal tissue destruction.

Methods: A total of 397 women (mean age 75.5 years) were randomly selected for an ancillary study of periodontal disease, presence or absence of the teeth and osteoporosis. All subjects were participants at the Pittsburgh Center for the Study of Osteoporotic Fractures (SOF), a prospective cohort study of women 65 years of age or older designed to determine risk factors for fractures. Oral health examinations, including periodontal probing and attachment loss, were performed at the fourth clinical visit, an average of 6 years after baseline. BMD of the total hip and its sub-regions were measured using dual energy X ray absorptiometry at the time of dental examination, and two years later results are expressed as annual % change. Generalized linear models were used to assess the association between BMD and presence or absence of teeth and periodontal status. Periodontal variables included average loss of periodontal attachment (LOA), number of sites with at least 4mm of attachment loss, presence or absence of calculus, and presence or absence of teeth.

Results: A total of 145 (36.4%) women were edentulous and 163 (80.7%) had periodontal disease. Dentate women reported higher education ($p < 0.001$), and a higher calcium intake ($P = 0.002$). Edentulous women were more likely to lose BMD at the trochanter compared to dentate women, ($-0.86\%/yr$ vs. $-0.52\%/yr$, $P = 0.045$) respectively. There was no difference in bone loss at the total hip or femoral neck, and there was no difference in age or weight. BMD of the hip and change in BMD also did not differ by periodontal assessments.

Conclusion: We concluded there was little evidence of an association between edentulousness, periodontal disease and longitudinal changes in BMD.

web-J Dent Res: Abstract #2451 (2003)

Prevalence of Periodontal Disease In First Year Dental Students

FAMILI, P., MILLER, R., SEYEDAIN, A., and JOHNS, L., University of Pittsburgh, PA, USA

Objectives: Prevalence of periodontal disease varies with race, age, smoking, and diabetes. The pattern of dental disease in the human population can be affected by variables such as age, sex, race, occupation, and social behavior. Although periodontal patients are more susceptible to infections and impaired host responses are likely, it is still unclear why diabetics are at a higher risk for severe periodontitis. The purpose of this 4-year study was to compare the prevalence of periodontal disease in first year dental students at the University of Pittsburgh School of Dental Medicine with a family history of diabetes and students without any family history of diabetes.

Methods: The periodontal examination included probing depths, attachment loss measurements, plus plaque and bleeding indices.

Results: 212 students participated in this study. 61 presented with a family history of diabetes. Out of the 61 students with a family history of diabetes, 39 were white, 5 were black, 4 were Hispanic and 13 were Asian. Of the 212 participating students, 141 were male and 71 were female. Out of the 212 students 162 were white, 5 were African American, 11 were Hispanic, and 34 were Asian. An ANOVA found no significant difference between groups ($p=0.279$). Chi square analysis showed a moderate correlation between race and family history of diabetes ($P=0.0310$).

Conclusions: This study failed to find a relationship between periodontal disease and a family history of diabetes.

web-J Dent Res: Abstract #1061 (2004)

Determination of Association between Development of Oral Disease and Genetic and Functional Alterations in Viral Genome of HIV-1 Positive Long Term Asymptomatic and Early Onset Individuals

GRAY, B. and AYYAVOO, V; Department of Infectious Diseases and Microbiology, University of Pittsburgh Graduate School of Public Health.

For over ten years The Pitt Men's Study has been part of a Multicentered AIDS Cohort Study (MACS). During this time investigators have been evaluating everything from the way in which HIV-1 replicates to possible methods of preventing the virus from entering host cells. The demographics, oral physiology, and health behaviors of the population included in this study make it a unique population in which to study otherwise rare oral diseases.

Oral disease in HIV-1 patients (candidiasis, herpes simplex, varicella zoster, oral hairy leukoplakia, etc.) has been shown to be a good indicator of disease progression. Some individuals develop these symptoms within only a few years post seroconversion while others continue to live without these manifestations for decades. Strangely, not all of these manifestations are directly related to CD4+ count. Also known is that the viral accessory genes *vpr* and undergo certain genetic changes throughout the life of the host. Many of the regions of these genes are highly conserved while other specific regions have been shown to mutate readily.

Because HIV-1 manifestations are a good indicator of disease progression and that it is known that *vpr* and regions of the viral genome mutate throughout disease progression, we wish to conduct a retrospective study using the Pitt Men's study population to determine whether a relationship exists between the onset of oral disease in HIV-1 infected individuals and viral genetic changes.

Novel Vector Design to Express Multiple Antigens

GRAY, B., AYYAVOO, V., Department of Infectious Diseases and Microbiology, University of Pittsburgh Graduate School of Public Health.

Development of a safe, effective and affordable HIV-1 vaccine is considered to be an efficient means of controlling HIV-1 infection worldwide. However, it has been complicated by the fact that the observed genetic and biological variability of HIV-1 represents significant obstacles for vaccine development. It is generally understood that CTL's play a role in clearing viremia during primary infection and maintain disease-free state in HIV-1 infected patients. Because of this the development of and HIV vaccine should include a focus on generating CTL responses. Previous attempts at DNA vaccines have concentrated on HIV-1 env and gag constructs and have ignored accessory gene constructs such as vif, vpu, vpr, and nef. These studies have also indicated that additional work is needed to give broad protection from the virus. By developing a multiconstruct DNA vaccine, one may be able to elicit a broad-spectrum vaccine by providing multiple targets for CTL's. We propose to construct several multiconstruct vaccines for use in a lower primate challenge to see their ability to induce immune response in vivo.

Guided Tissue Regeneration Using Osteoinductive Polyurethane Membranes in Rabbit Maxillary Osteotomies

HANZON, J.D., GHANA, S., SHAND, J., GASSNER, R., BARBANO, T.E., COOPER, G.M., VERSCHUEREN, D., COSTELLO, B.J., AGARWAL, S., MOONEY, M.P.

Purpose: The development of fibrous nonunions following orthognathic surgery is thought to result in part from differential and more rapid migration of fibroblasts compared to osteoblasts into the wound site during healing. Recent experimental work has shown that guided tissue regeneration (GTR) reduced fibrous tissue ingrowth by approximately 64% at 4 weeks postop in rabbit maxillary osteotomies. The present study was designed to improve bony wound healing in rabbit maxillary osteotomies by using osteoinductive, collagen-seeded membranes for GTR.

Methods: Bilateral, modified Lefort I osteotomies (n=18) were produced in the maxillae of 9 adult New Zealand White rabbits. The maxillary segments were advanced approximately 6mm and rigidly fixed using bone microplates and screws. Six defects, randomly selected, were covered with a biodegradable polyurethane membrane seeded with rabbit type-I collagen, six defects were covered with an unseeded membrane, and the remaining six defects were left uncovered. The rabbits were followed with serial dorsoventral and lateral cephalographs taken at 0, 4, and 8 weeks postoperatively and then the maxillae were harvested for histological analysis.

Results: Radiographic analysis revealed that by 8 weeks postoperatively, defects covered with collagen-seeded membranes ($19.29 \pm 10.8\text{mm}^2$) and unseeded membranes ($17.63 \pm 6.8\text{mm}^2$) showed reduced defect areas compared to uncovered control defects ($24.90 \pm 8.7\text{mm}^2$, a reduction of approximately 40%. However, this was not significantly different ($F=1.02$; $p>0.05$). Histologically, membrane covered defects showed more rapid and organized new bone formation which bridged the osteotomy site compared to control defects. In contrast, uncovered control defects showed an increased amount of fibrous tissue and less organized bone formation in the osteotomy sites.

Conclusion: Results do not support the use of these polyurethane membranes to retard fibrous tissue ingrowth in rabbit maxillary osteotomies. Improved membrane pliability and the use of other osteoinductive molecules should be investigated. NIDCR T35 DE077336

Tissue Engineering Tooth Structure In Vitro from Dissociated Mouse Tooth Buds Utilizing Three Dimensional Biodegradable Scaffolds

KARAM, J., Mentors: Drs. Charles Sfeir & Nicholas Piesco

Introduction: Tooth loss as a result of disease, trauma, or genetic defect adversely affects mastication, speech, functional occlusion, and the esthetics of the dentition. The clinical practice of dentistry has evolved steadily offering a variety of treatment options for missing teeth. The potential fabrication of a vital biological tooth through tissue engineering would provide an invaluable option to replace a missing tooth. Studies have been performed using intact and dissociated tooth tissues to bioengineer complex tooth structures (Young, et al., 2002). Seeding single cell suspensions of dissociated porcine tooth buds into biodegradable polymer scaffolds *in vivo* has led to the development of tooth structures complete with odontoblasts and dentin, pulp chamber, Hertwig's root sheath epithelia, cementoblasts, and an enamel organ with fully developed enamel (Young, et al., 2002). Using dissociated tooth buds as opposed to intact tooth buds holds the potential advantage of using a scaffold to engineer the size and shape of the replacement tooth. Although complex tooth structures have been created from dissociated tooth buds, the task of creating a complex tooth structure with designated size and shape has not yet been accomplished.

Relationship of Genetic Variants in Coding Regions of the Msx-1 Gene to Non-syndromic Cleft Lip with or without Cleft Palate Patients and Controls.

KIM, K., GORRY, M.C., MICHAIELEC, M., MARAZITA, M.L., HART, T.C.

Introduction: Cleft lip and cleft palate (CL/P) are the most frequent congenital craniofacial birth defects in humans, affecting 0.67/1000 live births. The etiology of non-syndromic cleft lip with or without cleft palate (CL+/-CP) is believed to be multifactorial, and to result from the interaction of genetic and environmental factors. The Msx-1 gene has been implicated as being a contributing factor in mediating epithelial-mesenchymal interactions during embryological development of craniofacial and palatal bones. Recently it has been suggested that genetic alterations of the Msx-1 transcription factor may be etiologically important in at least some cases of non-syndromic CL+/-CP. The objective of this study is to characterize genetic variation in coding regions of the Msx-1 gene and to determine if any of the genetic variants are associated with CL+/-CP.

Materials and Methods: A total of 124 patients were investigated in this study. Cases were drawn from three studies of CL+/-CP: (1) 38 multiplex CL/P families from Shanghai, China; (2) 31 consanguineous CL/P families from Ankara, Turkey; (3) 55 multiplex CL/P families from the Pittsburgh Oral-Facial Cleft Study. Two types of controls were evaluated for each ethnic group. The first control group involved studying an unaffected (CL+/-CP) sibling for each affected individual in each ethnic group. Secondly, unaffected and unrelated controls were studied for each ethnic group. Following DNA Purification, Amplification and Sequencing of the Msx-1 gene using big dye terminator chemistry, DNA sequence analysis was performed using the Sequencher 4.0.5 program.

Results: Single Nucleotide Polymorphisms (SNPs) were identified in regions of Intron 1 and Exon 2. No exonic SNPs were found in any of the three study populations. Five intronic SNPs were identified: n3682 G/T; n3689C/T; n3694A/G; n3696G/T and n3718-3726PolyT. The n3689 and n3696 SNPs were identified in only one person. The n3694 and n3718-3726 SNPs were present in linkage disequilibrium. These SNPs were more prevalent in affected than unaffected individuals. In general, genetic variance was greatest in the Pittsburgh population (present in 40% of affected individuals) and least in the Turkish population (present in 7% of affected individuals). Sequence analysis also revealed two unaffected individuals exhibiting exonic SNPs, one of which resulted in an amino acid change, Glu→Asp. The SNPs that are the most prevalent in these study groups are in the intronic region of the gene, and although they are more prevalent in CL+/-CP patients, they do not appear functionally significant.

Conclusion: Genetic variance in the Msx-1 gene has been proposed to be etiologically important in cleft lip and palate. Contrary to some previous literature reports, genetic variance in Msx-1 Exon 2 does not appear to be etiologic in the three study populations we examined.

References:

Jezewski P, Vieira AR, Nishimura C, Ludwig B, Johnson M, O'Brien SE, Daack-Hirsch S, et al. Diagnostic resequencing demonstrates a role for Msx-1 in nonsyndromic cleft lip and palate. *Am J Hum Genet.* 2002;4-34.
Wang KY, Juriloff DM, Diewert VM. Deficient and delayed primary palatal fusion and mesenchymal bridge formation in cleft lip-labile strains of mice. *J Craniofac Gent Dev Biol.* 1995 Jul-Sep; 15(3):99-116

From The University of Tennessee Health Science Center College of Dentistry Hinman Student Research Symposium, October 24, 25, 26, 2003, Peabody Hotel, Memphis, Tennessee.

Loss of Chemokine CXCL₁₄ Expression in Oral Squamous Cell Carcinoma (SCC) as a New Mechanism of Tumor Escape from Immune Recognition

KOGAN, D., COLLINS, B., WATCHMAKER, P., PEREZ, L., TOURKOVA, I.L., SHURIN, G.V., SHURIN, M.R.
University of Pittsburgh, Pennsylvania

Objectives: Dendritic cells (DC) play a key role in the induction and regulation of specific antitumor immunity by acquiring antigens from tumor cells and presenting them to effector T cells. The immune surveillance is likely to depend in part on the presence of chemokines in the tumor microenvironment, which control the homing of DC to the appropriate site. However, the function and targets of a new CXC breast and kidney-expressed chemokine (BRACK;CXCL14) are unknown. Hromas *et al.* reported that CXCL14 is expressed ubiquitously in normal tissues, but is almost absent in cancer cell lines. Our hypothesis is that the loss of expression of CXCL14 by squamous cell carcinoma (SCC) may play a role in the SCC escape mechanism from immune recognition by down-regulating DC attraction and homing at the site of the tumor.

Methods: To test this hypothesis, we have analyzed the effects of SCC cell lines on the chemoattraction of human DC *in vitro* and determined expression of CXCL14 protein in SCC tissues obtained from cancer patients. The effect of CXCL14 on DC chemotaxis was evaluated in the migration assay *in vitro*. Furthermore, paraffin embedded tumor tissue samples of SCC with different degrees of dysplasia (served as control) were analyzed for infiltrating DC.

Results: *In vitro* analysis revealed that CXCL14 chemoattracted human DC in a dose-dependent manner, while SCC conditioned medium did not. Immunohistochemical examination of these specimens revealed that oral SCC tissues display significantly lower infiltration by CD1a, CD83, and CD11c positive DC, when compared to oral dysplasia tissues.

Conclusions: Thus, it is likely that DC migration into the SCC tissues might be inhibited compared with their migration to dysplastic or pre-malignant lesions due to the down-regulated expression of DC chemoattractant CXCL14. These results not only revealed a new mechanism of tumor escape and bring new insights in understanding of tumor-host interaction, but also may serve as a basis for the development of new immunotherapeutic approaches for treatment of patients with oral SCC.

web-J Dent Res: Abstract #0224 (2003)

Fixed/Removable Full Arch Implant-Supported Prosthesis: Analysis of Published Data

ALI, M.¹, ISMAIL, Y.², CLOSE, J.¹, SHMERELZON, M.¹, and LEUNG, B.¹, University of Pittsburgh, PA, USA,
²University of Pittsburgh, PA.

Edentulous arches include implant supported fixed prostheses and implant supported removable prostheses. The removable prostheses had been advocated because of lesser cost, less demanding oral hygiene for the elderly, and better support for the oral-facial soft tissues. On the other hand, the implants' survival and prostheses' serviceability of either option has not been properly addressed.

Methods: A literature search was conducted using the bibliographic database MEDLINE for the past 20 years regarding the effectiveness of both treatment options for full arch implant restoration. Thirty-four articles were obtained according to pre-identified inclusion criteria. Fifty-eight observations of prostheses type (31 implant supported fixed prostheses, and 27 implant supported removable prostheses) and location (27 maxillary and 31 mandibular arches), were included for a follow up time of 1-15 years. The number of implants for support of prostheses was also evaluated and the survival rate of implants was calculated. A t-test and logistic regression test were utilized to analyze the findings.

Results: The results indicated no significant difference in survival rate between prostheses types (fixed or removable) and location (maxilla or mandible) during the first five years of function ($p > 0.06$). However, the survival rate of fixed prostheses was significantly higher for over five years follow up periods ($p > 0.0001$). A positive relationship between the number of implants and survival rate of both prosthesis types was also observed.

Conclusion: Based on these results, it was concluded that implant supported fixed prostheses are more favorable due to better survival rate, and that increasing the number of implants for support of removable prostheses is recommended to improve their survival rate.

web-J Dent Res: Abstract #0838 (2004)

Chromosome Abnormalities in Multiplex Families with Cleft Lip/Palate

LIANG, K.-Y., WENGER, S., GHALICHEBAF, M. WVU SoD & SoM

Cleft lip with or without cleft palate (CLIP) is one of the most common birth defects in the world with an incidence of one in every 500-1000 births. Genetic etiology of nonsyndromic oral facial cleft is complex, possibly heterogeneous, and may involve the interaction of multiple gene loci.

Objective: The purpose of this study is to identify syndromic forms of cleft due to chromosome abnormalities among cleft patients with at least one other affected family member. This project is conducted to better understand this disorder and chromosomal abnormalities that may help identify genes associated with clefting. Chromosomal abnormalities found in the participating families can lead to pertinent genetic counseling, as well as estimate the incidence of 22q and telomere deletions or rearrangements in CLIP.

Method: Blood samples collected from two or more members in a family with multiplex kindreds (with 2 or more affected) were analyzed using karyotype and fluorescent in situ hybridization (FISH) to detect any chromosomal abnormalities deletions/rearrangements.

Result: To date, blood samples have been collected on 21 individuals with CLIP from 16 multiplex families. The result revealed that karyotypes on 21 patients are normal, and for 16 probands, the telomeres are normal. Two of 19 patients had a 22q deletion. These 2 are siblings from one family who have DiGeorge syndrome.

Conclusion: Genetic defects associated with nonsyndromic CLIP are smaller than 2-3 Mb; thus they are not able to be identified at the resolution of 500 band length karyotype. Cytogenetics can be used for the identification of syndromic cleft as well as help identify genes that may be involved in nonsyndromic clefts. The incidence of 22q deletion among the CLIP population is higher than the general population.

web-J Dent Res: Abstract #1296 (2004)

Amelogenin Splice Product Regulate Gene Expression in Mineralized Cells

LIN, Y.T., University of Pittsburgh, PA, USA, JADLOWIEC, J.A., Carnegie Mellon University, Pittsburgh, PA, USA, VEIS, A., Northwestern University Medical School, Chicago, IL, USA, and SFEIR, C., University of Pittsburgh, PA

Background: Periodontal disease is a process, which causes the destruction of the periodontal attachment apparatus around teeth. The role of the attachment apparatus that consists of bone, periodontal ligament and cementum is to allow physiologic movement and function of the tooth. Amelogenins are extracellular matrix proteins known to play an important role during enamel formation and more recently implicated in periodontal regeneration. However, the mechanisms of action of Amelogenin to induce periodontal regeneration are not well understood. It is hypothesized that the Amelogenins activity is to differentiate uncommitted or follicle cells to become cementoblast cells.

Objectives: To elucidate the role of Amelogenin splice products on cementoblast and undifferentiated cells by 1) quantifying gene expression of key molecules involved in bone/cementum formation, 2) measuring phenotypic changes such as mineralization and proliferation.

Methods: We utilized quantitative PCR (qPCR) to quantify gene expression levels of Runx2, Osterix (Osx), bone/liver/kidney alkaline phosphatase (Alp), Osteocalcin (Ocn) and bone sialoprotein (Bsp) in response to A-4 or A4 in OCCM30 and human Mesenchymal Stem Cells. To measure phenotypic outcome, we measured calcium deposition by alizarin red staining and cell proliferation by fluorescence techniques. Significant differences among treatment groups were determined by a one-way ANOVA with Fisher's LSD post hoc test at a 95% confidence level.

Results: A4 and A-4 regulated these bone marker genes by either up or down-regulating their expression. This data will be presented and how it may relate to periodontal regeneration will be discussed.

Conclusion: A-4 and A4 play a critical role in regulating the bone marker gene expression. It also appears that different splice products have distinctive roles.

web-J Dent Res: Abstract #2155 (2004)

Lutz, Angela

Prevalence of Selected Radiographic Anomalies in Children.

LUTZ, A.S.*, STUDEN-PAVLOVICH, D., RANALLI, D.N., CLOSE, J.M., University of Pittsburgh, School of Dental Medicine, USA.

Previous studies of radiographic dental anomalies of children in clinic settings have been well-documented.

Purpose: The purpose of this study was to determine the prevalence of selected dental anomalies of number, shape, structure and position using a retrospective analysis of existing panoramic radiographs from three private pediatric dental practices in western Pennsylvania.

Methods: The subjects ranged in age from 5 to 15 years and demonstrated mixed and permanent dentitions. Each radiograph was read on a dental view box by the primary investigator who is a licensed dentist (intra-rater reliability = 0.99%). Excessive peripheral and background room light were eliminated. Anomalies were recorded on a specifically designed data collection form. Patients who had any predisposing conditions were eliminated from the study. Data were analyzed using descriptive statistics. A total of 1,120 panoramic radiographs met the inclusion criteria.

Results: Congenital absence of one or more teeth was found in 154 subjects (14%). Twenty one subjects (15 males, 6 females) exhibited a total of 27 supernumerary teeth (2%), the most frequent being mesiodens. Only 1 case of fusion was noted, 3 separate cases of gemination, and 2 cases of concrescence were found. Microdontia was seen in 36 (3%) of the patients and 4 children had macrodonts. Anomalies of structure and texture included 1 child with dentinogenesis imperfecta, 2 with amelogenesis imperfecta, and 1 with odontodysplasia. Anomalies of structure and texture anomalies occurred within the sample. Anomalies of position occurred in 4% of the patients as ectopic eruptions. Seven children (1%) exhibited transposition of teeth and inversion in 2 subjects. Overall, of the 1,120 subjects, 279 (25%) were affected by one or more of these selected dental anomalies.

Conclusions: Findings of the private pediatric dental practices in this study were similar to those reported in clinical settings.

Pediatric Dentistry 25:(2)175, 2003.

Mager, Donna

Poster, IADR/AADR/CADR

The Oral Microbiota of Insulin-dependent Diabetic Subjects and Non-Diabetic Controls

MAGER, D.¹, CORBY, P.M.², GOODSON, J.¹, MOORE, P.A.², and YASKELL, T.^{1, 1} The Forsyth Institute, Boston, MA, USA, ² University of Pittsburgh, PA

Objectives: Differences in the microbiota of 8 oral soft tissues and saliva from 46 insulin-dependent diabetic subjects and 33 systemically healthy age-matched control subjects were evaluated.

Methods: Microbial samples were taken separately from the dorsal, lateral and ventral surfaces of the tongue, floor of mouth, cheek, hard palate, vestibule/lip and attached gingiva using a "buccal brush" in all subjects. Saliva samples were collected by expectoration. Samples were evaluated for their content of 40 bacterial species using checkerboard DNA hybridization. The percent of total DNA probe count was determined at each site for each species, and averaged across subjects and sites within populations. Significance of differences was determined using the Kruskal-Wallis test with $p < 0.001$ considered significant.

Results: Microbial profiles between the 2 populations clearly differed. Diabetic subjects had significantly higher proportions of *Capnocytophaga* and *Actinomyces* spp. and lower proportions of *Fusobacteria* and *Streptococci* spp. The proportion of some capnocytophaga in saliva (e.g. *C. ochracea*) exhibited significant positive correlations with glycated hemoglobin levels.

Conclusions: The oral soft tissue microbiota of insulin-dependent diabetic subjects differed from that found in systemically healthy subjects. Soft tissue sites in diabetic subjects were colonized by higher proportions of *Capnocytophaga* and *Actinomyces* spp. while *Fusobacteria* and *Streptococci* spp. were lower. Supported by NIH grants DE 13668, DE14472, DK34818 and K23 DE-00453

web-J Dent Res: Abstract #1583 (2004)

Dopamine System Genes and Human Motor Activity

MAHER, B.S., VANYUKOV, M.M., MARAZITA, M.L., FERRELL, R.E..

The dopamine system is hypothesized to play a major role in variation in human activity levels. We applied a measured-genotype approach to investigate the association of polymorphisms at several dopamine system genes with measured motor activity in a population of 103 10-12 year old Caucasian males. Motor activity was measured using an acceleration sensitive wrist-worn monitor worn by each subject during a standardized two-day research protocol. A VNTR polymorphism in the 3' UTR region of the dopamine transporter (DAT1) was significantly associated, without Bonferroni correction, with motor activity. Polymorphisms in the dopamine receptors D1, D2, D4 and D5 were not associated with motor activity.

American Journal of Human Genetics 73(supplement):521, 2003.

A Preliminary Investigation of the Relationship Between Attention Deficit Hyperactivity Disorder and Dental Caries.

Maher, B.S., Vanyukov, M.M., Marazita, M.L., Bretz, W.A., Corby, P.M., Weyant, R.J.

Attention Deficit Hyperactivity Disorder (ADHD) is a common disorder of childhood, affecting approximately 3-9% of school-aged children. ADHD is generally conceptualized as a deficit in behavioral self-regulation. Behavioral self-regulation may be an important predictor of a child's ability to transition to effective oral self-care. The relationship between oral health and self-regulation was investigated in a sample of 287 subjects (191 male, 96 female) ascertained via a longitudinal study of substance abuse. Oral health was parameterized as an index of decayed, missing and filled teeth (DMFT) in subjects with a mean age of 16.43 (sd = 2.88) with permanent dentition. Self-regulation was measured using lifetime DSM-III-R ADHD symptom counts (total symptom count, inattention symptom count, hyperactivity-impulsiveness symptom count) assessed at age 10-12. Pearson correlation coefficients were calculated to test the hypothesis that ADHD symptom count is related to age-adjusted DMFT index. There was a moderately significant relationship between ADHD symptom count ($p=0.035$) and inattention symptom count ($p=0.023$) and age adjusted DMFT index. A similar pattern of results was observed within the gender subgroups. Further investigation is necessary to examine the precise role of behavioral self-regulation in variation in the liability to orodental disease.

Variants in SKI, IRF6, and RFC1 Are Associated with Cleft Lip/Palate in a South American Population.

VIEIRA, A.R., ORIOLI, I.M., CASTILLA, E.E., COOPER, M.C., MARAZITA, M.L., MURRAY, J.C..

ECLAMC (Latin American Collaborative Study of Congenital Malformations) is a program which has investigated the causes of congenital malformations and their frequencies in Latin American hospitals since 1967. Beginning in January 1998, ECLAMC has collected biological samples from children with nonsyndromic oral-facial clefts (NSOFC) and their mothers for molecular analysis. NSOFC are common congenital malformations known to occur in approximately 1/1,000 live births in ECLAMC hospitals. The present study used the likelihood ratio test (LRT)-based analysis to detect non-Mendelian transmission of DNA sequence variants in IF6, SKI, RFC1, MTHFR, TGFA, and TGFB3 to 233 South American children from their respective mothers. The results show association between NS cleft lip (CL) and SKI ($p=0.004$) and weaker association with NS cleft lip with or without cleft palate (CL/P) ($p=0.042$). Previous studies have shown that the frequency of mitochondrial haplotype D (HapD) among these clefting cases is higher than the general population. When the analysis was divided by children with HapD versus any other haplotype group, no differences between these two groups were seen for SKI, but an association between CL/P and IRF6 ($p=0.023$), and CL and RFC1 ($p=0.017$) was seen only for the no HapD group. These results support previous linkage and linkage disequilibrium findings with 1p36, 1q32, and 4p in humans and suggest that SKI, IRF6, and RFC1 mutations make a contribution to clefts in South American populations; however, these contributions will depend on the type of Amerindian ancestry.

Am J Human Genetics 73 (Suppl):519, 2003

A Two Stage Genome-Wide Linkage Scan for Nonsyndromic Cleft Lip and Palate in 215 Filipino Families Shows Evidence of Linkage to 2p21, 6q23, and 8p21.

SCHULTZ, R.E., COOPER, M.E., RILEY, B.M., GOLDSTEIN, T.H., DAACK-HIRSCH, S., MARAZITA, M.L., and MURRAY, J.C..

Non syndromic (NS) CL/P is a complex multifactorial disorder resulting from a combination of genetic and environmental factors. NS CLP has a birth prevalence of 1 per 500 in the Philippines where large families provide an opportunity for gene localization approaches using mapping. A genome-wide linkage scan was performed in two stages on 220 extended Filipino families with ≥ 2 individuals affected with NS CL/P. Genotyping on 390 microsatellite repeat markers spaced at 10 cM intervals over the genome was performed first by CIDR on 109 families with 282 affecteds and 543 unaffecteds. Genotyping was next performed in a second group of 111 families with 285 affecteds and 566 unaffecteds to replicate and extend the results from the first group.

Two-point and multipoint parametric linkage analyses were performed by the method of LOD scores (FASTLINK, SIMWALK2). Nonparametric TDT and multipoint linkage statistics were also calculated (SIMWALK2, FBAT).

The first scan identified 10 regions with LOD >1.0 or $P < 0.05$ in one or more tests. These regions were also positive in the second scan; the pooled results from the total of 220 families showed the most significant results for 2p, 6q and 8p.

The region on 8p has not been found in any previous genome wide scan nor does it contain any of the several candidate genes widely studied in CLP. We have begun fine mapping in 8p21 using SNP markers from genes in the region and looking for evidence of linkage and association. Eight genes (FZD3, SLC8A1, PPP3CC, EPHX2, BNIP3L, EGR3, PPP2R2A and NAT1) extending over the 20 cM of 8p with $\text{lod} > 1.0$ were studied using SNPs and TaqMan assays in the first family set. The extended family set and an additional 500 parent-case triads are now being used to look for evidence of transmission distortion for a SNP in the gene PPP3CC which had a single-point recessive LOD of 1.91 at $\alpha = 0.3$ in the original 109 families. PPP3CC is a calmodulin-dependent protein phosphatase, also known as calcineurin A3. This protein is an alternative splice variant of the testis-specific catalytic subunit, calcineurin gamma-A, which is thought to associate with sperm flagellum.

Fine mapping studies of regions 2p21 and 6q23 are also underway. TGFA on 2p13, has long been considered a candidate gene for NS CL/P. Note that a meta-analysis of the current genome scan with several other CL/P genome scans also found positive results for chromosomes 2 and 6 (ASHG presentation by Marazita et al). In summary, we report the largest genome scan to date on NS CL/P and identify 3 regions with highly positive results. A strong candidate gene on 8p is under intensive scrutiny with direct DNA sequencing of coding exons underway. For the first time, fine mapping and gene identification appears feasible for NS CL/P.

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IRF6 is a Major Modifier for Nonsyndromic Cleft Lip and Palate

ZUCCHERO, T., COOPER, M.E., CAPRAU, D., RIBIERO, L., SUZUKI, Y., YOSHIURA, K., CHRISTENSEN, K., MORENO, L., JOHNSON, M., GILL, M., LIDRAL, A., KONDO, S., SCHUTTE, B., MARAZITA, M.L., MURRAY, J.C..

We reported that mutations in Interferon Regulatory Factor 6 (IRF6) cause the most prevalent form of syndromic cleft lip and palate, Van der Woude syndrome (VWS). VWS has a phenotype similar to non-syndromic cleft lip with or without cleft palate (NSCLP) and NS cleft palate alone (NSCP), with the only additional feature being pits in the lower lip. To determine if IRF6 plays a role in NSCLP and/or NSCP, we evaluated a SNP identified within the coding sequence of IRF6 that changes a highly conserved amino acid, V274I. This SNP was genotyped on members of 3,530 nuclear families from 1,719 extended kindreds of various ethnicities, including Asians, Caucasians, South Americans, and Indians. Transmission disequilibrium (TDT) analysis revealed highly significant overtransmission of the V allele of this SNP from parents to NSCLP affected children ($p < 10^{-9}$), but not NSCP ($p = 0.99$). This association was strongest in Asian and weak or absent in some Caucasian groups. 287 Filipino NSCLP triads were genotyped for V274I plus 10 additional SNPs in the region. Haplotypes were generated using the EM algorithm, and TDT analysis revealed a strong positive association with the most common haplotype ($p < 10^{-5}$). The associated haplotype extends out 200kb 3' of IRF6. There was also significant linkage disequilibrium in the region (D ranging from 0.23 to 1.0). Sequencing of the entire 25 kb IRF6 genomic region in 24 individuals affected with NSCLP has thus far revealed 71 novel variants, 16 of which are etiologic candidates. Our results provide a resource for direct mutation identification and for the first time identify a major modifier for NSCLP. Studies of IRF6 have significant implications for genetic counseling, especially in assessing the risk of recurrence of NSCLP in a family.

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Meta-analysis of 11 Genome Scans for Cleft lip with or without Cleft Palate.

MARAZITA, M.L., MURRAY, J.C., COOPER, M.E., GOLDSTEIN, T.H., SCHULTZ, R.E., DAACK-HIRSCH, S., FIELD, L., LIU, Y., TUNCBILEK, G., RAY, A., PRESCOTT, N., WINTER, R., WYSZYNSKI, D., BAILEY-WILSON, J., ALBACHA-HEJAZI, H., LIDRAL, A., MORENO, L., ARCOS-BURGOS, M., BEATY, T..

Despite many genetic studies of nonsyndromic cleft lip with or without cleft palate (NSCL/P) progress has been slow with results varying between studies. To identify genetic regions likely to include CL/P susceptibility loci, we performed a meta-analysis of 11 genome scans (568 multiplex families, 3543 genotyped individuals): 4 scans published or in press (England, Prescott et al; China, Marazita et al; Syria, Wyszynski et al; Turkey, Marazita et al), 4 presented at this meeting (Philippines, Schultz et al; Pennsylvania, Weinberg et al & Neiswanger et al; Colombia & Ohio, Moreno et al), and 3 recently completed (Turkey, China, India). We used the Genome Scan Meta-Analysis method (GSMA, Wise et al) that allows the combination of genome-scan results from studies with differing markers, statistical analyses, and/or family types. The genome was divided into 124 30-cM bins. In each study each bin was ranked according to the bin's best linkage result, bin ranks were summed over all studies and GSMA p-values determined. 10 bins representing 6 chromosomes had p-values <0.05.

Notable results supporting previous reports with NSCL/P include 1q22.3-41 (p=0.02/0.03; 2 adjacent bins, IRF6 region-see Zuccherro et al, this meeting), 2p13 (p=0.003, region with TGFA), 6p21.3-21.1 (p=0.01), 17q12 (p<0.001, region with RARA). Novel regions identified include 2q35-36 (p<0.0001), 7p13-15 (p=0.004), 7q22-qter (p=0.03/0.04; 2 adjacent bins), 12q24-qter (p=0.03). Thus, this first meta-analysis of NSCL/P identified multiple regions to focus fine mapping and candidate gene identification efforts. NIH grants DE-09886, DE-12472, DE-08559, DE-13076, DE-14667, RR-00084; UK Action Research, Birth Defects Foundation; Mammalian Genotyping Service; Center for Inherited Disease Research.

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Genome Scan for Loci in Multiplex Nonsyndromic Cleft Lip Families from Columbia and Ohio

MORENO, L., ARCOS-BURGOS, M., **MARAZITA, M.L.**, COOPER, M.E., GOLDSTEIN, T.H., KRAHN, K., VALENCIA, C., LIDRAL, A.C..

Introduction: Nonsyndromic cleft lip with or without palate (CL/P) is a common, genetically complex birth defect. Previous human studies are contradictory suggesting that population heterogeneity may exist. To date two genome-wide scans for CL/P have been reported revealing evidence for linkage to over 12 different loci (Prescott et al. 2000, Marazita et al., 2002).

Purpose: The purpose of this study is to complete a 10 cM genome-wide scan in 48 multiplex families from Colombia-SA and 9 multiplex families from Ohio.

Methods: Singlepoint (MLINK) and multipoint (SIMWALK) linkage analyses were performed using parametric dominant and recessive models.

Results: Preliminary results in the Colombian and Ohio data set showed evidence of linkage for the following loci:

COLOMBIA	3q27	9q22	14q23	15p12	19q13			
MLS	2.99	2.94	2.29	2.78	.72			
OHIO	1p22	3p14	9q33	10q25	12q24	14q11	17q11	18q12
MLS	3.52	1.73	1.60	1.52	2.36	1.76	1.77	1.23

Conclusions: 7 loci previously identified as having a role in CL/P have been replicated in this study. Furthermore, 6 new loci have been identified confirming population heterogeneity. Efforts are ongoing to complete nonparametric linkage and association analyses in both data sets.

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Anti-TGF- β 2 Antibody Inhibits Postoperative Resynostosis in Craniosynostotic Rabbits

MOONEY, M.P., LOSKEN, H.W. MOURSI, A., MITCHELL, R., WINNARD, P., BRADLEY, J., AZARI, K., ACARTURK, O., OPPERMAN, L.A., SIEGEL, M.I.

Purpose: Recent studies have shown that developmental changes in the expression of the various Transforming Growth Factor- (Tgf- β 2) isoforms control normal cranial suture formation, maintenance, and fusion. It has been suggested that an over-expression of Tgf- β 2 causes craniosynostosis and postoperative resynostosis. Interference with Tgf- β 2 production and/or function may prevent postoperative resynostosis. The present study was designed to test this hypothesis in a craniosynostotic rabbit model.

Methods: To date, 30 New Zealand white rabbits with coronal suture synostosis have been divided into 3 groups: 1) Suturectomy controls (n=8); 2) Suturectomy with non specific, control IgG antibody in a slow release collagen vehicle, (n=9); and 3) Suturectomy with anti- Tgf- β 2 antibody in a slow release collagen vehicle (n=13). At 10 days of age, a 3mm x 10mm coronal suturectomy was performed in all rabbits. The sites in Groups 2 and 3 were immediately filled with 0.1cc of a slow resorbing (90-180 day), collagen gel mixed with either IgG antibody (100 μ g/suture) or anti- Tgf- β 2 antibody (100 μ g/suture). Serial 3D-CT scan reconstructions of the defects were obtained at 10, 25, 42, and 84 days of age and the sutures were then harvested for histomorphometric analysis.

Results: Preliminary analysis of the 3D-CT scan data revealed that the sites which were treated with anti- Tgf- β 2 antibody showed significantly ($p < 0.05$) greater defect areas and intracranial volumes through 84 days of age compared to untreated and IgG control rabbits. Qualitative histological examination also showed that defects treated with anti- Tgf- β 2 antibodies had patent suturectomy sites and more fibrous tissue in the defects when compared to control rabbits.

Conclusions: These preliminary data support our initial hypothesis that interference with Tgf- β 2 production and/or function may prevent postoperative resynostosis. These findings also suggest that this cytokine therapy may have potential clinical use to prevent postoperative resynostosis in infants with craniosynostosis.

This work was supported in part by a grant from NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore MD. The collagen vehicle was provided by NeuColl Inc., Campbell, CA.

Localization of Bone Morphogenetic Proteins (BMPs) in the Perisutural Tissues of Craniosynostotic Rabbits.

SHAND, J.M., SCIOTE, J.J., MITCHELL, R., COOPER G.M., COSTELLO, B.J., MOONEY, M.P.

Objectives: Studies have demonstrated a differential expression of the various transforming growth factor isoforms that have been found in rabbits and humans with familial nonsyndromic craniosynostosis. Bone morphogenetic proteins interact with Tgf- β 2's and little is known about the relationship between the over- or under-expression of BMP's in craniosynostosis. The aim of this study was to investigate the localization and expression of BMP-2, BMP-4 and BMP-7 in the perisutural tissues, in a rabbit model of familial craniosynostosis, to further understand their role in suture pathogenesis.

Methods: Ten day old New Zealand white rabbits were investigated: six wild type, control rabbits (N=12 coronal sutures) and six rabbits with coronal suture synostosis (N=12 coronal sutures). All the rabbits were obtained from the breeding colony of synostosed rabbits at the University of Pittsburgh. At ten days of age the rabbits were euthanized, the calvariae were harvested en-bloc and processed for immunohistochemistry. Using an indirect immunoperoxidase procedure with isoform specific antibodies the periosteum, dura mater, osteogenic fronts of the coronal suture, and sutural ligament were stained for the presence of BMP-2, BMP-4 and BMP-7 proteins. Spatial staining patterns were evaluated by qualitative analysis.

Results: Results revealed differential staining patterns between the synostosed and wild-type perisutural tissues was consistently demonstrated by BMP immunoreactivity. The synostotic sutures had more bone in the osteogenic fronts compared to the wild type sutures. In synostosed coronal sutures BMP-2 and BMP-4 had greater staining intensity in the periosteum, dura mater, and the diploe/osteogenic fronts in comparison to wild-type sutures.

Conclusion: Preliminary findings suggest that BMP-2 and BMP-4 are differentially expressed which may result in hyperostosis and premature suture fusion in this craniosynostotic rabbit model.

This work was supported in part by grants from the NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore, MD and University of Pittsburgh School of Dental Medicine, PA.

Expression of Bone Morphogenetic Proteins in the Perisutural Tissues in the Craniosynostotic Rabbit

SHAND, J.M., SCIOTE, J.J., COOPER, G. M., MOONEY, M.P., COSTELLO, B.J., MITCHELL, R.

Objectives: Studies have demonstrated a differential expression of the various transforming growth factor isoforms that have been found in rabbits and humans with familial nonsyndromic craniosynostosis. Bone morphogenetic proteins interact with Tgf- β 2's and little is known about the relationship between the over- or under-expression of BMP's in craniosynostosis. The aim of this study was to investigate the localization and expression of BMP-2, BMP-4 and BMP-7 in the perisutural tissues, in a rabbit model of familial craniosynostosis, to further understand their role in suture pathogenesis.

Methods: Ten day old New Zealand white rabbits were investigated: six wild type, control rabbits (N=12 coronal sutures) and six rabbits with coronal suture synostosis (N=12 coronal sutures). All the rabbits were obtained from the breeding colony of synostosed rabbits at the University of Pittsburgh. At ten days of age the rabbits were euthanized, the calvariae were harvested en-bloc and processed for immunohistochemistry. Using an indirect immunoperoxidase procedure with isoform specific antibodies the periosteum, dura mater, osteogenic fronts of the coronal suture, and sutural ligament were stained for the presence of BMP-2, BMP-4 and BMP-7 proteins. Spatial staining patterns were evaluated by qualitative analysis.

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Conclusion: Preliminary findings suggest that BMP-2 and BMP-4 are differentially expressed which may result in hyperostosis and premature suture fusion in this craniosynostotic rabbit model.

This work was supported in part by grants from the NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore, MD and University of Pittsburgh School of Dental Medicine, PA.

web-J Dent Res: Abstract #2890 (2003)

Bone Morphogenetic Proteins (BMPs) in the Perisutural Tissues in the Craniosynostotic Rabbit.

COOPER, G.M., SHAND, J.M., SCIOTE, J.J., MITCHELL, R., COSTELLO, B.J., MOONEY, M.P.

Objectives: Studies have demonstrated a differential expression of the various transforming growth factor isoforms that have been found in rabbits and humans with familial nonsyndromic craniosynostosis. Bone morphogenetic proteins interact with Tgf- β 2's and little is known about the relationship between the over- or under-expression of BMP's in craniosynostosis. The aim of this study was to investigate the localization and expression of BMP-2, BMP-4 and BMP-7 in the perisutural tissues, in a rabbit model of familial craniosynostosis, to further understand their role in suture pathogenesis.

Methods: Ten day old New Zealand white rabbits were investigated: six wild type, control rabbits (N=12 coronal sutures) and six rabbits with coronal suture synostosis (N=12 coronal sutures). All the rabbits were obtained from the breeding colony of synostosed rabbits at the University of Pittsburgh. At ten days of age the rabbits were euthanized, the calvariae were harvested en-bloc and processed for immunohistochemistry. Using an indirect immunoperoxidase procedure with isoform specific antibodies the periosteum, dura mater, osteogenic fronts of the coronal suture, and sutural ligament were stained for the presence of BMP-2, BMP-4 and BMP-7 proteins. Spatial staining patterns were evaluated by qualitative analysis.

Results: Results revealed differential staining patterns between the synostosed and wild-type perisutural tissues was consistently demonstrated by BMP immunoreactivity. The synostotic sutures had more bone in the osteogenic fronts compared to the wild type sutures. In synostosed coronal sutures BMP-2 and BMP-4 had greater staining intensity in the periosteum, dura mater, and the diploe/osteogenic fronts in comparison to wild-type sutures.

Conclusion: Preliminary findings suggest that BMP-2 and BMP-4 are differentially expressed which may result in hyperostosis and premature suture fusion in this craniosynostotic rabbit model.

This work was supported in part by grants from the NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore, MD and University of Pittsburgh School of Dental Medicine, PA.

Bone Morphogenetic Protein Expression in Perisutural Tissues of Craniosynostotic Rabbits

CACCAMESE, J., SHAND, J.M., SCIOTE, J.J., MITCHELL, R., COOPER, G.M., COSTELLO, B.J., MOONEY, M.P.

Objectives: Studies have demonstrated a differential expression of the various transforming growth factor isoforms that have been found in rabbits and humans with familial nonsyndromic craniosynostosis. Bone morphogenetic proteins interact with Tgf- β 2's and little is known about the relationship between the over- or under-expression of BMP's in craniosynostosis. The aim of this study was to investigate the localization and expression of BMP-2, BMP-4 and BMP-7 in the perisutural tissues, in a rabbit model of familial craniosynostosis, to further understand their role in suture pathogenesis.

Methods: Ten day old New Zealand white rabbits were investigated: six wild type, control rabbits (N=12 coronal sutures) and six rabbits with coronal suture synostosis (N=12 coronal sutures). All the rabbits were obtained from the breeding colony of synostosed rabbits at the University of Pittsburgh. At ten days of age the rabbits were euthanized, the calvariae were harvested en-bloc and processed for immunohistochemistry. Using an indirect immunoperoxidase procedure with isoform specific antibodies the periosteum, dura mater, osteogenic fronts of the coronal suture, and sutural ligament were stained for the presence of BMP-2, BMP-4 and BMP-7 proteins. Spatial staining patterns were evaluated by qualitative analysis.

Results: Results revealed differential staining patterns between the synostosed and wild-type perisutural tissues was consistently demonstrated by BMP immunoreactivity. The synostotic sutures had more bone in the osteogenic fronts compared to the wild type sutures. In synostosed coronal sutures BMP-2 and BMP-4 had greater staining intensity in the periosteum, dura mater, and the diploe/osteogenic fronts in comparison to wild-type sutures.

Conclusion: Preliminary findings suggest that BMP-2 and BMP-4 are differentially expressed which may result in hyperostosis and premature suture fusion in this craniosynostotic rabbit model.

This work was supported in part by grants from the NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore, MD and University of Pittsburgh School of Dental Medicine, PA.

web-J Dent Res: Abstract #2561 (2004)

FGF-Receptor Expression in the Perisutural Tissue of Craniosynostotic Expression

DUNLAVEY, K., SCIOTE, J.J., MOONEY, M. P.

Objective: Recent studies have demonstrated that mutations in various fibroblast growth factor receptors (FGFR1, FGFR2, FGFR3) result in a myriad of dysostotic syndromes (i.e. Crouzon, Apert, Muenke). The purpose of the present study is to describe the expression patterns of these growth factor receptors (FGFR1, FGFR2, FGFR3) in the perisutural tissues of a rabbit model of craniosynostosis to help elucidate the etiopathogenesis of this condition.

Methods: Twenty coronal sutures were harvested from 10, 10 day old New Zealand white rabbits: five wild type, control rabbits (n = 10 coronal sutures), and five rabbits with familial coronal suture synostosis (n = 10 coronal sutures). All rabbits were obtained from the synostosed breeding colony at the University of Pittsburgh. At ten days of age the rabbits were euthanized, the calvariae were harvested en bloc and processed for immunohistochemistry. The periosteum, dura mater, osteogenic fronts of the coronal suture, and sutural ligament were stained for the presence of FGFR1, FGFR2, and FGFR3 using an indirect immunoperoxidase procedure with isoform specific antibodies. Staining intensity by tissue type and group were ranked by three investigators for each receptor and statistically evaluated using a chi-square analysis.

Results: A significant ($p < 0.05$) and highly differential staining pattern was observed for FGFR-1 in the periosteum and osteogenic fronts in which FGFR-1 was more abundant in wild-type rabbits compared to the synostosed rabbits. No significant differences ($p > 0.05$) in staining intensity were observed between tissue types or groups for either FGFR-2 or FGFR-3.

Conclusion: These findings suggest that FGF receptor expression at 10 days of age probably does not play a maintenance role in synostosis in this rabbit model. However, further receptor-localization and receptor-function data is needed from fetal rabbit sutures to validate this conclusion.

This work was supported in part by grants from NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore MD., an AAOMS Training Award for Health Professions Students at the University of Pittsburgh, and an NIH T35 Short-Term Dental Student Research Training Program Award at the University of Pittsburgh School of Dental Medicine.

web-J Dent Res: Abstract #0014 (2004)

Suture Fusion Rescue with Tgf- β 2 Antibody in Craniosynostotic Rabbits

MOONEY, M.P., SHAND, J.M., MITCHELL, R., MOURSI, A.M., WINNARD, P., CACCAMESE, J., COSTELLO, B.J., COOPER, G.M., BARBANO, R., LOSKEN, H.W., OPPERMAN, L.A., SIEGEL, M.I.

Purpose: Premature coronal suture fusion (craniosynostosis) affects 300-500 per 1,000,000 births and is associated with secondary deformities in the cranial vault and cranial base. It has been suggested that an over expression of Tgf- β 2 results in calvarial hyperostosis and eventual suture fusion. Neutralizing antibodies to Tgf- β 2 may potentially block Tgf- β 2 activity and help "rescue" fusing coronal sutures in affected individuals. The present study was designed to test this hypothesis in a rabbit model of familial craniosynostosis.

Methods: Thirty New Zealand White rabbits with bilateral delayed-onset coronal suture synostosis had radiopaque dental amalgam markers placed on either side of the coronal sutures at 10 days of age (synostosis occurs at approximately 42 days of age). At 25 days of age, the rabbits were randomly assigned to three groups of 10 each: 1) Sham control rabbits; 2) Rabbits with non specific, control IgG antibody (100 μ g/suture) delivered in a slow release collagen vehicle, and; 3) Rabbits with Tgf- β 2 neutralizing antibody (100 μ g/suture) delivered in a slow release collagen. The collagen vehicle in Groups 2 and 3 was injected subperiosteally above the coronal suture. Longitudinal head radiographs and somatic growth data were collected from each animal at 10, 25, 42, and 84 days of age. The sutures were harvested en-bloc at 84 days of age.

Results: Radiographic analysis showed significantly greater ($p < 0.05$) coronal suture marker separation in the rabbits treated with anti- Tgf- β 2 antibody compared to the other groups at 42 and 84 days of age. Preliminary, qualitative histological analysis revealed patent coronal sutures, thin osteogenic fronts, and wide sutural ligaments in the Tgf- β 2 neutralizing antibody group compared to controls, especially on the ectocranial surface.

Conclusions: This data support our initial hypothesis that interference with Tgf- β 2 production and/or function may rescue prematurely fusing coronal sutures and facilitate coronal suture growth in this rabbit model. These findings also suggest that this cytokine therapy may have potential clinical significance in infants with insidious or progressive postgestational craniosynostosis.

This work was supported in part by a grant from NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore MD. The collagen vehicle was provided by NeuColl Inc., Campbell, CA.

web-J Dent Res: Abstract #2558 (2004)

Muscle-derived Stem Cells Expressing Noggin Inhibit Cranial Defect Healing

COOPER, G.M., PENG, H., USAS, A., MOONEY, M.P., HUARD, J.

Introduction: Bone overgrowth is common in cases of rheumatoid arthritis, fibrodysplasia ossificans progressiva, and craniosynostosis. Bone morphogenetic proteins (BMPs) are potent osteoinductive proteins whose increased activity has been implicated in several bone disorders. We have shown previously that retroviral delivery of noggin, a known BMP antagonist, is capable of inhibiting bone formation in several models of heterotopic ossification. The current study was designed to test the hypothesis that ex vivo noggin gene therapy will inhibit bone healing in a rodent non-critical-sized defect (nCSD).

Methods: Mouse muscle-derived stem cells (MDSCs) were transduced with a retrovirus to express Noggin, expression was analyzed via bioassay. A round 1.5mm nCSD was created in the parietal bone of each of the 6 adult mice used in the study. The mice were divided into: 1) untreated control group (n=3); 2) MDSC-Noggin-treated group (n=3). In the Group 2 animals, a collagen vehicle seeded with 1×10^5 transduced cells was implanted to cover the nCSD. Bone healing was monitored via radiographic and histological analysis 3, 6, and 12 weeks post-operatively. A comparative study using a larger number of rats is currently underway.

Results: Radiographic analysis revealed a marked reduction in bone formation in the mice treated with Noggin compared with the untreated controls. Histological analysis confirmed the radiographic data. Quantitative radiographic analysis indicated that the Noggin-treated defects displayed healing of approximately 25% of the original defect area, whereas untreated control defects displayed approximately 80% healing.

Conclusions: These results suggest that gene therapy with cells transduced to express Noggin effectively reduced the amount of bone that formed within healing cranial defects. These results suggest that the delivery of Noggin by ex vivo gene therapy may constitute an effective treatment strategy for bone overgrowth disorders.

web-J Dent Res: Abstract #1517 (2004)

Rescue of Premature Coronal Suture Fusion with Tgf- β 2 Neutralizing Antibody in Rabbits with Delayed Onset Synostosis

MOONEY, M.P., SHAND, J.M., MOURSI, A.M., WINNARD, P., COOPER, G.M., CACCAMESE, J., COSTELLO, B.J., OPPERMAN, L.A., LOSKEN, H.W., SIEGEL, M.I.

Purpose: Premature coronal suture fusion (craniosynostosis) affects 300-500 per 1,000,000 births and is associated with secondary deformities in the cranial vault and cranial base. It has been suggested that an over expression of Tgf- β 2 results in calvarial hyperostosis and eventual suture fusion. Neutralizing antibodies to Tgf- β 2 may potentially block Tgf- β 2 activity and help "rescue" fusing coronal sutures in affected individuals. The present study was designed to test this hypothesis in a rabbit model of familial craniosynostosis.

Methods: Thirty New Zealand White rabbits with bilateral delayed-onset coronal suture synostosis had radiopaque dental amalgam markers placed on either side of the coronal sutures at 10 days of age (synostosis occurs at approximately 42 days of age). At 25 days of age, the rabbits were randomly assigned to three groups of 10 each: 1) Sham control rabbits; 2) Rabbits with non specific, control IgG antibody (100 μ g/suture) delivered in a slow release collagen vehicle, and; 3) Rabbits with Tgf- β 2 neutralizing antibody (100 μ g/suture) delivered in a slow release collagen. The collagen vehicle in Groups 2 and 3 was injected subperiosteally above the coronal suture. Longitudinal head radiographs and somatic growth data were collected from each animal at 10, 25, 42, and 84 days of age. The sutures were harvested en-bloc at 84 days of age.

Results: Radiographic analysis showed significantly greater ($p < 0.05$) coronal suture marker separation in the rabbits treated with anti-Tgf- β 2 antibody compared to the other groups at 42 and 84 days of age. Preliminary, qualitative histological analysis revealed patent coronal sutures, thin osteogenic fronts, and wide sutural ligaments in the Tgf- β 2 neutralizing antibody group compared to controls, especially on the ectocranial surface.

Conclusions: This data support our initial hypothesis that interference with Tgf- β 2 production and/or function may rescue prematurely fusing coronal sutures and facilitate coronal suture growth in this rabbit model. These findings also suggest that this cytokine therapy may have potential clinical significance in infants with insidious or progressive postgestational craniosynostosis.

This work was supported in part by a grant from NIH/NIDCR (DE13078) to the Center for Craniofacial Development and Disorders, Johns Hopkins University, Baltimore MD. The collagen vehicle was provided by NeuColl Inc., Campbell, CA.

Growth Comparison via Linear Distance Analysis of Craniosynostotic Rabbits Treated with anti-Tgf- β 2 Antibody at Suturectomy Site

FRAZIER, B., **MOONEY, M.P.**, LOSKEN H.W., BARBANO, T., MOURSI, A., MARTIN,T., SIEGEL, M.I., YAN, P., RICHTSMEIER, J..

Purpose: Current research suggests that over-expression of Tgf- β 2 may be implicated in craniosynostosis and postoperative resynostosis. Inhibition of Tgf- β 2 expression may prevent postoperative resynostosis. The present study tests for differences in craniofacial growth patterns between craniosynostotic rabbits treated with neutralizing Tgf- β 2 antibodies and controls.

Methods: The study sample included 24 rabbits with bicoronal synostosis which had undergone suturectomy at 10 days of age, divided into three groups: 1) controls (n=7); 2) postoperative injection of non-specific control IgG antibody (n=7); and 3) postoperative injection of anti-Tgf- β 2 antibody (n=10). Computed tomography (CT) scans of each rabbit were acquired at 10, 25, 42 and 84 days of age. Eighteen craniofacial landmarks were collected from 3D-CT reconstructions. Euclidean Distance Matrix Analysis (EDMA) was then used to compare patterns of growth and morphology in each of the three groups.

Results: Rabbits treated with anti-Tgf- β 2 antibody differed significantly at both 25 and 84 days of age compared to age matched Control and IgG rabbits. These differences were evident in the medio-lateral dimensions of the braincase, and in the rostro-caudal dimensions of the snout. In contrast, preliminary analyses of growth patterns show no significant differences between the three treatment groups from 25 to 84 days of age.

Conclusion: This analysis supports the hypothesis that Tgf- β 2 inhibition will alter growth around the affected (suturectomy) region of the skull producing alterations in skull morphology, although it does not show significantly altered growth trajectory in general from 25 days of age to 84 days of age. These results indicate that the significant differences in growth occur during the first 15 days after treatment.

This work was supported in part by: National Institutes of Health Service Grant P60 DE13078

Expanded Strip Craniectomy and Postoperative Molding Helmet for Scaphocephaly: Patient Selection as a Factor in Outcome.VEGA, S., HUA, L., **MOONEY, M.P.**, COOPER, G.M., WEINBERG, S.M., SILBERSTEIN, H., LOSEE, J.

Objective: This study represents a retrospective quantitative analysis of all patients seen at the University of Rochester Children's Hospital Center for Craniofacial Surgery for Sagittal Synostosis (SS). The purpose of this study was to determine if Expanded Strip Craniectomy and Helmet Therapy (ESCHT) was more effective than Expanded Strip Craniectomy without Helmet Therapy (ESC) or Calvarial Vault Remodeling (CVR). In addition, we examine what patient factors influence outcome of patients that underwent ESCHT.

Methods: Patients who met inclusion criteria had (1) A diagnosis of Sagittal Synostosis, (2) Operative treatment with Expanded Strip Craniectomy (ESC) and Helmet Therapy (HT), and (3) Both preoperative and postoperative standardized 3D computed tomography of the cranium. Subjects with syndromic craniofacial anomalies, craniosynostosis of other cranial sutures, skull trauma or other major medical diagnosis were excluded. A total of eight patients met inclusion criteria. They were evaluated in a retrospective fashion using institutional medical records, and plastic surgery office charts. The following information was obtained: sex, past medical and surgical history, clinical exam of craniofacial skeleton, age at operation, operative procedure, OR time, estimated blood loss, transfusion history, hospital length of stay, duration of follow up, postoperative complications, compliance with helmet use, and duration of helmet therapy. Archived CT scans were obtained and reviewed by a neuroradiologist and a craniofacial surgeon. The most useful and objective measurement of surgical outcomes for SS is the cranial index (CI). The CI has been consistently used in the literature for the past decade, thus serving as a reliable and reproducible reference index between studies. The CI is the ratio of maximum calvarial width divided by the maximum calvarial length and multiplied by 100. Cranial Indices were measured and recorded for all patients. Three general types of statistical analysis were performed: 1.) Comparison of CI measurements at different times within the same individuals who underwent ESCHT, 2.) Comparison of CI measurements from our cohort with a previously published cohort of patient who underwent ESC, and 3.) Comparison of CI measurements from our cohort with a previously published cohort of patient who underwent CVR. Both pre and post operative CI for the ESC and the CVR samples were obtained from Panchal et al. The Wilcoxon signed rank test was used to determine statistical significance when comparing preoperative CI with postoperative CI within the same individuals. The independent sample t test was used to compare CI measurements between two different groups of individuals. Compliance, OR time, Age at operation, Complications and Preoperative Severity were also examined as they contributed to postoperative Cranial Index.

Results: The mean preoperative CI for patients undergoing ESCHT was 69 for our sample of 8 patients. The mean age at operation was 4.3 months. In comparison with normative data, all patients had pretreatment CI below normal range, except one who was only 1 month 23 days at the time of surgery (pre-op CI = 75), but was operated on due to CT diagnosed sagittal suture synostosis. For ESCHT patients the one year postoperative CI improved from 69 to 75 ($p = 0.0078$). The mean change in pre vs. postoperative CI was 6 for the ESCHT cohort. The mean preoperative CI of 28 patients (mean age = 5.1 months) who underwent ESC was 67. There was no statistical difference in preoperative CI between the ESCHT and ESC cohorts. For ESC patients the one year postoperative CI improved from 67 to 71. The mean change in pre vs. postoperative CI was 4 for the ESC cohort. The mean change in CI was 6 for ESCHT patients compared to 4 for ESC patients. This difference was statistically significant ($p = 0.0016$). For the 12 CVR patients (mean age = 5.2) the mean preoperative CI was 66 and mean postoperative CI was 74; with a change in CI of 8. We found no statistical difference between the change in CI between the ESCHT patients and the CVR patients ($p = 0.41$). Evaluation of compliance with helmet therapy showed a trend, but no statistical significance for higher CI in compliant patients compared to noncompliant patients at one year. Age at time of surgery also showed a trend towards higher CI at one year in younger patients compared to older patients.

Conclusion: This study shows statistically significant improvement in CI for patients undergoing ESCHT. This is similar to other studies evaluating ESC as a treatment option for Sagittal Synostosis. Our study shows that ESCHT is more effective than ESC in the treatment of Sagittal Synostosis. When compared to CVR the change in CI for patients undergoing ESCHT was not statistically significant. This suggests that patients may have comparable change in CI when treated with either modality. Given the large blood loss, extended operative time and greater critical care requirements of pediatric patients undergoing CVR, ESCHT appears to be a safer treatment of Sagittal Synostosis with similar results. Finally, we maintain that compliance with helmet therapy and age at operation are two factors which influence postoperative CI for ESCHT patients. This was not a statistically significant finding given the small sample size of our population. However, further research should elucidate this trend.

Oral Health and Overall General Health: High School Awareness

MULLINS, L.M.*, CROUT, R., WEARDEN, S., AUSTIN, S., and W. MULLINS WVU SoD & SoM, Department of Statistics

The first Surgeon General's Report on Oral Health reported an association between oral health and preterm low birth weight babies, cardiovascular disease and diabetes. Little or no literature exists about the knowledge of high school students regarding the connection between oral conditions and systemic conditions.

Objectives: The purpose of this project was to assess the knowledge of high school students regarding this connection and evaluate the usefulness of a tailored intervention utilizing a control and experimental school in a rural setting.

Methods: Fifty four high school students from Boone County, West Virginia were recruited. Twenty-five students represented the control school and twenty-nine students represented the experimental school. Simultaneously, both schools received a 14 question Likert-style pretest followed two weeks later by an identical posttest. However, following the completion of the pretest, the experimental school received a thirty-minute Power Point lecture format presentation stressing the topics addressed in the pretest while the control school did not. Comparisons were tabulated between the control and experimental groups.

Results: No significant differences were noted between the pretests of both schools. Posttest comparisons to the pretests revealed that the experimental school gained significant knowledge ($p \geq 0.05$) in all areas compared to no differences seen with the control school.

Conclusions: A thirty minute tailored intervention stressing oral and overall health related issues significantly increased the student's knowledge level, which was retained for at least two weeks. Strategies such as this may be beneficial in other school environments. Furthermore, this study could emphasize the need for modifications in secondary school health curriculums.

web-J Dent Res: Abstract #3377 (2004)

Genome Scan of Cleft Lip with or without Cleft Palate (CL/P): Part II: Broadening the Phenotype to Include Velopharyngeal Incompetence (VPI).

NEISWANGER, K., FORD, M.D., COOPER, M.E., GOLDSTEIN, T.H., PETIPRIN, S.S., BARDI, K.M., BRANDON, C.A., GILES, R.F., **MARAZITA, M.L.**

Nonsyndromic CL/P is a common birth defect with a complex, multifactorial etiology. Individuals with CL/P have a variable range of speech deficits, including anatomical and/or functional problems with their velopharyngeal (VP) mechanism. The purpose of this study is to seek genetic regions that may be important in the VP portion of the CL/P phenotype. We used the University of Pittsburgh Weighted Values for Speech Symptoms Associated with VPI scale to assess the VP status of 36 CL/P and 86 unaffected family members in 23 multiplex, nonsyndromic CL/P Caucasian families ascertained through the University of Pittsburgh Cleft Palate-Craniofacial Center. Scores of 0 on this assessment are considered VP competent (unaffected), and scores of 1 or higher are considered VPI (affected). We performed a genome scan using 392 anonymous markers spaced an average of 9 cM apart (from CIDR). Single-point and multipoint parametric and nonparametric linkage analyses were performed. We calculated the results twice--first using CL/P as the affected phenotype, and then repeating the analysis with a broad definition that added 19 non-CL/P family members with VPI scores > 0. The highest single-point LOD scores using the broad definition of affection status were +1.95, +1.74, and +1.74 for markers on chromosomes 5, 1 and 7, respectively. None of these scores occurred within 30 cM of the highest LOD scores on each chromosome under the narrow definition. These results suggest that the genes predisposing to VPI are not the same set of genes as the primary CL/P genes. Instead, they may modify the expression of primary CL/P genes, or act to alter the VP mechanism independently of clefting. Supported by NIH grants DE13076 & RR00084; genotyping grant from the Center for Inherited Disease Research.

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Objective and Subjective Social Status: Evaluation of Independent Associations in Host Resistance to the Common Cold

POLK, D.E., Behavioral Sciences, University of Pittsburgh, Pittsburgh, PA, **COHEN, S.**, Psychology, Carnegie Mellon University, Pittsburgh, PA, **ADLER, N.E.**, Psychiatry, University of California, San Francisco, San Francisco, CA

Better health may be associated with higher subjective status independent of objective status. We examined this prediction in susceptibility to the common cold in 334 healthy adults. Objective status was assessed by fathers', mothers', and participants' years of education, which were standardized and averaged. Subjective status was assessed by 2 10-“rung” ladders representing their status in their community and society generally. These 2 items were standardized and averaged. Subsequently, participants were exposed to rhinoviruses and monitored in quarantine for infection. As expected, measures of education were more strongly correlated with the society ladder, r 's = .11 - .23, than with the community ladder, r 's = .02 - .05. Higher subjective status was related to lower probability of subsequent infection, $B = -0.35$, $SE = 0.18$, $p < .05$, while education was not significantly related. Gender interacted with both status measures. Women from more educated backgrounds had a lower probability of infection than did the remaining 3 groups, $B = 0.41$, $SE = 0.19$, $p < .03$. Similarly, women with higher subjective status had a lower probability of becoming infected than did the remaining 3 groups, $B = 0.35$, $SE = 0.18$, $p < .05$. When both education and subjective status were entered simultaneously, neither was significant and the interactions with sex were marginal. These results demonstrate construct and predictive validity of the measure of subjective status; it appears to tap factors that are important for health and not assessed by existing measures of objective social status. Support provided by NIMH MH-50429, MH-00721, and the MacArthur Foundation.

Independent Associations of Objective and Subjective Social Status with Caries

POLK, D.E., **CORBY, P.M.**, **BRETZ, W.A.**, **MARKOVIC, N.**, **WEYANT, R.**

Background: Objective and subjective measures of social status are correlated with many health status measures.

Objective: To examine the independent associations of parental objective and subjective social status with caries extent and severity in 602 low socioeconomic status Brazilian twins age 1 1/2 – 7 years.

Methods: We assessed fathers' and mothers' education, family income, and subjective social status in the community and society, using single-item 10-point scales. Twins underwent standardized caries exams. Four measures of oral health were obtained: a) number of tooth surfaces with caries; b) number of tooth surfaces with caries per number of tooth surfaces; c) number of occlusal surfaces with caries per number of tooth surfaces with caries; and d) lesion severity per number of tooth surfaces. Lesion severity was rated on a 4-point scale classifying the extent to which the lesion had penetrated into the tooth, and scores were summed across all lesions. Multilevel modeling was used with age, sex, race, and zygosity as control variables.

Results: Both measures of subjective social status were moderately correlated with education and income (r 's = .50 - .63). Higher scores on all four predictors were associated with lower levels of all four indicators of caries ($F[1,298]$'s = 5.18 – 17.18, all p 's < .01). After controlling for either education or income, neither subjective social status measure was associated with the outcome variables.

Conclusion: Subjective social status was not independently associated with the caries outcome variables. Possible explanations include the use of parental and not child measures of subjective social status, the validity of subjective social status in children this young, or the validity of subjective social status in the Brazilian culture. Support for the study provided by NIDCR DE13534 and K12-DE14528.

Rapp, Manny

Emdogain as a Storage Medium for Maintaining Viability of Periodontal Ligament Cells.

RAPP, M.*, RANALLI, D.N., AGARWAL, S., CLOSE, J.M., University of Pittsburgh, School of Dental Medicine, USA.

Root resorption is a leading cause of failure in treatment of avulsed permanent teeth. The type of root resorption that occurs is based on several factors among which is the medium used to preserve the avulsed tooth. Periodontal ligament (PDL) cells are required to maintain, repair or generate the tooth attachment apparatus. Enamel Matrix Derivative (EMD) is believed to facilitate cell attachment and growth.

Purpose: The purpose of this study was to determine if a commercially available EMD, Emdogain, could maintain PDL cell viability to enhance reattachment of a clinically avulsed tooth.

Methods: The PDL cells were harvested from the roots of healthy human molars that were devoid of periodontal disease. The cells were isolated and characterized by the technique described by Agarwal S et al (Infection and Immunity, 1990). Storage media tested included TCM (control), Hank's Balanced Salt Solution (HBSS), and Emdogain at concentrations of 5.0, 2.5, 1.25, 0.62, 0.32, 0.1 and 0.05 mg/mL for 1, 2, 6 and 24 hours. All experiments and controls were replicated in 4 wells, following which the media were drained and stained with crystal violet. Specimens were read at 490 nm by Dynatech model MR 5000 plate reader and data were analyzed by 4x4 ANOVA followed by the Tukey-HSD post hoc comparison test.

Results: Emdogain at 100 mg/mL supported PDL cell viability significantly higher than HBSS.

Conclusions: Further research is required.

Pediatric Dentistry 25:(2)173; 2003.

Roccia, Wayne (4th Year)

Poster, IADR/AADR/CADR

Automated External Defibrillator Use Among the General Population

ROCCIA, W.D., MODIC, P., CUDDY, M.J., DMD, University of Pittsburgh, PA, USA

Automated External Defibrillators (AED) are becoming more prominent in public locations within the mainstream of our society. They are marketed as providing the ability for a broader range of people, beyond clinicians and community emergency medical services personnel, to successfully defibrillate a person in cardiac arrest.

Objectives: To determine whether or not a member of the general population, without previous exposure to an AED, could successfully operate an AED; thus delivering the necessary shock in ventricular fibrillation arrest. In addition, the authors analyzed the relationship between health care training and the time required to defibrillate a patient utilizing an AED and investigated the overall success of operating an AED with respect to health care training.

Methods: Utilizing an AED trainer, the authors conducted a timed trial study of five subject categories (1.general population, 2.first year dental students, 3.third year dental students, 4.dentists, hygienists, nurses, and 5.anesthesiologists, surgeons) as each operator attempted to defibrillate a mannequin (n=50). Their times, success in defibrillation and comments were recorded.

Results: The general population group experienced 80% failure rate, while the other groups showed an inverse relationship between failure rates and the amount of health care training. Overall, only 58% of the subjects successfully performed the defibrillation with the AED. Operator speed in relation to the amount of health care training showed another inverse relationship as times decreased from group one to group five.

Conclusion: The findings suggest that prior exposure to an AED leads to a greater number of successful defibrillations. It remains unclear at this time as to whether a member of the general population can successfully operate an AED.

web-J Dent Res: Abstract #3428 (2004)

Study of Effect of Tacrolimus vs. Cyclosporine on Gingival Overgrowth

SCHAEFER, A.T., FAMILI, P., University of Pittsburgh School of Dental Medicine, Pittsburgh, PA

Objectives: A variety of drugs have been found to produce gingival overgrowth in patients taking them. The anti-rejection drug cyclosporine has been found to exhibit gingival hyperplasia in approximately 30% of patients. Tacrolimus is structurally different from cyclosporine, but has a similar ability to inhibit the rejection of transplanted organs. The purpose of this study was to find the prevalence of gingival hyperplasia in patients who had undergone a transplant and were taking either tacrolimus or cyclosporine.

Methods: Two-hundred patients participated in this study. One-hundred and thirty-six patients were taking tacrolimus, forty-four were taking cyclosporine, and twenty were taking a combination of both drugs. An analysis of variance (ANOVA) was used to test for significant effect differences on gingival hyperplasia among the groups across pre and post drug administration times.

Results: At pre-administration, no significant differences were found on hyperplasia between the two drug type groups; at post-administration, the groups differed significantly ($p = 0.005$). There was no significant pre to post change in the tacrolimus group ($p = 0.083$), but in the cyclosporine group a significant change was found ($p = 0.008$). The difference in post administration hyperplasia proportions between the tacrolimus and cyclosporine groups was 12.5% versus 61.5%, respectively.

Conclusion: These results indicate that tacrolimus is associated with notably less gingival hyperplasia than cyclosporine. The findings are consistent with the results of previous studies found in the literature.

web-J Dent Res: Abstract #1068 (2004)

Schleyer, Titus

DIDR

Retrieval and Classification of Dental Research Articles

BARTLING, W.C., SCHLEYER, T.K., VISWESWARAN, S.

Successful retrieval of a corpus of literature on a broad topic can be difficult. This study demonstrates a method to retrieve the dental and craniofacial research literature. We explored MeSH manually for dental or craniofacial indexing terms. MEDLINE was searched using these terms, and a random sample of references was extracted from the resulting set. Sixteen dental research experts categorized these articles, reading only the title and abstract, as either: (1) dental research, (2) dental non-research, (3) non-dental, or (4) not sure. Identify Patient Sets (IPS), a probabilistic text classifier, created models, based on the presence or absence of words or UMLS phrases, that distinguished dental research articles from all others. These models were applied to a test set with different inputs for each article: (1) title and abstract only, (2) MeSH terms only, or (3) both. By title and abstract only, IPS correctly classified 64% of all dental research articles present in the test set. The percentage of correctly classified dental research articles present in the test set. The percentage of correctly classified dental research articles in this retrieved set was 71%. MeSH term inclusion decreased performance. Computer programs that use text input to categorize articles may aid in retrieval of a broad corpus of literature better than indexing terms or key words alone.

Schleyer, Titus

DIDR

Comparative Genomics and Structure Prediction of Dental Matrix Proteins

KRISHNARAJUL, R.K., HART, T.C., SCHLEYER, T.K.

Non-collagenous matrix proteins secreted by the ameloblasts (amelogenin) and odontoblasts (osteocalcin) play important roles in the mineralization of enamel and dentin. In this study, comparative genomics approaches were used to identify the functional domains and model the three dimensional structure of amelogenin and osteocalcin, respectively. Multiple sequence analysis of amelogenin in different species showed a high degree of sequence conservation at the nucleotide and protein levels. At the protein level, motifs (a sequence pattern that occurs repeatedly in a group of related proteins or genes), conserved domains, secondary structural characteristics, and functional sites of amelogenin from lower phyla were similar to those of the higher-level mammals, reflecting the high degree of sequence conservation during vertebrate evolution. Osteocalcin, produced by both odontoblasts and osteoblasts, also showed sequence similarity between species. Three-dimensional structure predictions developed by modeling of conserved domains of osteocalcin supported a role for glutamic acid residues in the calcium mineralization process.

Masseter Muscle Fiber Types Vary With Facial Morphology

SCIOTE, J.¹, RAOUL, G.², ROWLERSON, A.³, FERRI, J.², and CLOSE, J.¹, ¹University of Pittsburgh, PA, USA, ²University of Lille, France, ³Kings College, London, United Kingdom

Objective: This study characterized fiber type composition of masseter muscle to determine the extent to which fiber type composition of a jaw-closing muscle varies with or modifies facial growth.

Methods: Masseter biopsies were obtained on 48 subjects (4 class I, 22 class II and 22 class III) during surgical correction of malocclusion. Four fiber types were identified after immunostaining of biopsy sections with myosin heavy chain specific antibodies, and the mean area of the fiber types and fiber number were determined in each of 6 subject groups (class II or class III and open, normal or deep bite). In addition, percent occupancy of biopsy for each fiber type was calculated from mean fiber area and fiber number data. A 2 X 3 X 4 MANOVA was used to determine significant differences between mean areas for fiber types, vertical relationships and sagittal relationships. Class I subjects were excluded from statistical analysis due to inadequate numbers.

Results: There were significant differences in percent occupancy for all the fiber types in bite groups with different vertical dimensions. Type I fiber occupancy was greater in open and normal bites and type II fibers in the deep bites. The fiber type with cardiac and developmental myosins (neonatal/atrial) varied little with facial type.

	Mean % occupancy of biopsies for each fiber type			
	Type I	Type II	Type I/II hybrid	Type neonatal/atrial
Open Bite	50.04%	8.62	25.77	13.58
Deep Bite	36.93%	33.02	17.38	12.68
Normal Bite	52.67%	15.48	21.44	10.40

The association between sagittal jaw relationships and mean fiber area was less strong, but in the Class III group average fiber area was significantly different between open, normal and deep bite subjects.

Conclusion: We conclude that vertical bite characteristics vary with the fiber type composition of masseter muscle.

web-J Dent Res: Abstract #0225 (2004)

Dermatoglyphics in Filipinos with Nonsyndromic Cleft Lip With or Without Cleft Palate (NS CL/P) and Their Relatives

SCOTT, N.M., WEINBERG, S.M., DAACK-HIRSCH, S., NEISWANGER, K., O'BRIEN, S., NEPOMUNCENO, B., MURRAY, J.C., **MARAZITA, M.L.**

Evidence of a relationship between orofacial clefting and dermatoglyphic patterns has been reported in several populations, but has never been investigated in a Filipino population. Dermatoglyphic patterns serve as a marker of the developmental disturbances (environmental and genetic) and increased fluctuating asymmetry (FA) often reported in orofacial cleft study populations. Therefore, we investigated dermatoglyphic patterns in 100 Filipinos with NS CL/P and 89 of their relatives, ascertained from 1998-1999. Patterns were categorized as arch, ulnar loop, radial loop, whorl or other, by two independent raters, who resolved any discrepancies by re-evaluation.

No significant differences were found in the frequency of types of patterns between males and females; this is notable because typically males have more whorl patterns and fewer arches than females. Overall, the frequency of arches was significantly increased and whorls decreased in the affected group ($p=0.006$ and $p=0.02$, respectively.) Affected females had significantly more ulnar loops and arches ($p=0.037$ and $p=0.033$, respectively), and fewer whorls ($p<0.0001$). There were no significant differences between affected and unaffected males. As a measure of FA, dissimilarity between pattern types on homologous fingers was quantified, and t-tests were performed. No significant differences in dissimilarity scores were found between males and females or between affected and unaffected groups. These results indicate that in this Filipino population, differences in frequency of dermatoglyphic pattern types exist between individuals with orofacial clefts and their unaffected relatives, with the major effect seen in females. This research was supported by NIH grants DE-08559 and DE-13076.

Phosphophoryn - Exon5 of DMP3- Regulates Osteoblast Gene Expression and Mineralization

The extracellular microenvironment influences tissue development and remodeling via signals which control cell proliferation, differentiation and survival. Growth factors and Extracellular Matrix proteins (ECM) each activate their respective pathway's independently or synergistically to induce tissue-specific gene expression. Non-collagenous bone/dentin ECM proteins such as phosphophoryn or bone sialoprotein have been implicated in matrix mineralization but their role as signaling molecules is not well understood. Our laboratory focuses on the role of ECM proteins in signaling and more specifically the ones involved in matrix mineralization. Data will be presented to show a novel role of phosphophoryn in cell signaling and differentiation.

Nano-structured CaP Particles for Plasmid Gene Delivery

SFEIR, C.¹, OLTON, D.², KO, H.-F.², RANI, V.², LI, J.¹, AND KUMTA, P.², ¹University of Pittsburgh, PA, USA, ²Carnegie Mellon University, Pittsburgh, PA, USA

Gene delivery can be achieved using non-viral (plasmid) techniques that are desirable because they are economical and low in toxicity.

Objectives: Our research focuses on developing novel synthesis methods of calcium phosphate (CaP) that can be used as a nonviral gene delivery carrier (nanocarrier). Exploiting the nanoscale phenomena of materials can provide for dramatically improved transfection efficiencies due to increased surface-active DNA binding sites and enhanced reactivity triggered by reduced materials dimensionality.

Methods: The synthesis of pure and doped calcium phosphate nanocarriers in aqueous conditions at physiologic pH, with different ionic charges called NanoCaPs, in the presence of plasmid DNA (pDNA) will be discussed. The newly synthesized nano particles are hypothesized to improve transfection efficiency. NanoCaPs will have several advantages over other techniques including providing for controlled loading of pDNA and enhanced pDNA entry (transfection) into the cell.

Results: The NanoCaPs provide an efficient transfection efficiency and the presentation will discuss the findings of these novel nanocarriers alone and as a nanocomposite with native polymers. Transfection efficiency data will be presented as well as a comparison of the transfection performance with other gene delivery systems.

Conclusion: the increased transfection efficiency and low toxicity provide an alternative delivery system for tissue engineering applications particularly to dental tissues.

web-J Dent Res: Abstract #0928 (2004)

A Comparison of Panoramic and Cross-Sectional Radiography in the Evaluation of Implant Selection and Placement

SHUMATE, D.*, GHAREEB, S., REED, H. WVU SoD

The use of cross-sectional radiography in planning the placement of endosseous dental implants has been questioned by many clinicians, and is often times not utilized at all. The purpose of this study is to determine if cross-sectional radiography should be included in the radiographic analysis in order to evaluate a potential implant site prior to surgery. The manner in which this information has been gathered and tabulated is as follows. The radiographs of 49 implant sites were examined from 14 different patients. These patients were chosen because they all had both cross-sectional radiographic surveys in the form of conventional tomography, and anteriorposterior surveys in the form of panoramographs taken. These patients additionally wore the same radiographic stent with known dimensions while both the panoramograph and tomograph were taken. Measurements were then taken from each patient's radiographs, and corrected for any distortion using the radiographic markers of known dimensions. The size, length, width, and path of insertion of the implant were decided upon using only the subject's panoramograph. The same site was then evaluated only using the measurements and path of insertion recorded from the patient's tomograph, and it was then determined if the size or path of insertion of the implant would be altered in order to avoid vital structures, perforation, severe angulation, or the potential for lack of success. The results of this project revealed that 75% of the implants decided upon from the panoramographic evaluation changed in either diameter or length once examined using the tomographs. These results lead us to conclude that cross-sectional imagery should be the standard of care for placing endosseous dental implants in their optimal position.

Human Papilloma Virus in Oral Exfoliated Cells and Risk of Head and Neck Cancer

SMITH, E., RITCHIE, J., **SUMMERSGILL, K.**, HOFFMAN, H., WANG, D., HAUGEN, T.H., and TUREK, L.P. U. of Iowa and Veterans Affairs Medical Center, Iowa City and U. of Pittsburgh, PA.

Objectives: The role of human papillomavirus (HPV) infection in head and neck cancer (HNC) is becoming clearer. This case-control study evaluated whether risk factors were different between HPV-infected and uninfected cases and controls, and whether HPV DNA found in exfoliated oral cells was an independent predictor of risk of head and neck cancer.

Methods: HPV DNA was evaluated from exfoliated oral cells in 201 oral and oropharyngeal cancer cases and 333 age-gender frequency matched controls using PCR and DNA sequencing to type HPV infection.

Findings: High-risk (HR) oncogenic HPV types were detected in 23% of cases and 11% of controls. After adjusting for age, tobacco, and alcohol use, the risk of malignancy was significantly greater for those with HPV-HR types (adj.OR=2.6, 95% CI:1.5-4.2), but not in those with low-risk HPV types, compared to uninfected patients. Furthermore, HPV-HR positivity in oral exfoliated cells was predictive of HR viral detection in biopsies of cancer cases. There was a significant synergistic effect between HR-infected heavy alcohol users compared to uninfected never users, whereas HPV-HR-associated risk with tobacco appeared to be additive.

Conclusions: HPV oncogenic infection is a significant risk factor for HNCs independent of alcohol and tobacco and acts synergistically with alcohol. High-risk types detected in oral exfoliated cells appear to be a significant predictor of oncogenic infection in HNCs, suggesting that an oral rinse may provide an early biomarker of cancer at a site noted for its low survival and significant morbidity.

Some Pitfalls of Medline Searches Using Keyword and Mesh Protocols.

SUMMERSGILL, K.F. University of Pittsburgh, Pittsburgh, Pennsylvania

Objectives: The use of computerized databases has revolutionized how we perform literature searches. However, some methods are more efficient and fruitful than others. This research was performed to identify some pitfalls of literature search protocols.

Methods: Using the Medline database from 1996 to November 15, 2003 in the OVID interface, I performed keyword and Medical Subject Heading (MeSH) searches of commonly misspelled words, British versus American English spelling, and words containing diacritical markings such as umlauts and tildes.

Findings: Misspelled words such as "boney", "persistance", "inflammation", and "erythematosis" occurred 16, 51, 10, and 19 times, respectively, and were far outnumbered by entries with the correct spelling. In general, diacritical markings are ignored in keywords, authors' names, and MeSH headings. The American form of a keyword greatly predominated over the British spelling of a keyword, and was much more likely to map more specifically to MeSH headings. Transliteration of the Germanic "ö" or "ä" to the expected "oe" and "ae" did not occur for keywords or authors in the databases. Those entries with a misspelled word often also contained the correctly-spelled version. Misspellings occurred most commonly in journals whose authors were not native speakers of English.

Conclusions: Although using keywords in literature searches is sometimes easier than using MeSH, one is likely to miss numerous relevant citations. In performing Medline database searches, we must be aware of the particular quirks of spelling and usage of the program.

Summersgill, Kurt F.

Oral, USCAP

Human Papillomavirus in Head and Neck Cancers

SUMMERSGILL, K.F., SMITH, E.M., RITCHIE, J., HAUGEN, T.H., and TUREK, L.P.. U of Pittsburgh, PA and Veterans Affairs Medical Center and U of Iowa, Iowa City, IA.

Background: The role of human papillomavirus (HPV) infection in cervical cancer is well established, and the evidence for HPV infection as a risk for some head and neck cancers increases. This study evaluated the association of HPV with tumor location, grade, stage, and patient age. Expression of viral oncogenes E6 and E7 and host integration were also examined.

Design: DNA from formalin-fixed, paraffin-embedded tumor blocks from 177 head and neck cancer patients was evaluated for HPV presence and type by PCR amplification with MY09/MY11 primers, dot blot hybridization, hemi-nested PCR, and sequencing. HPV-16 positive tumors for which frozen specimens were available were evaluated for E6/E7 oncogene expression. Integration of the viral DNA into the human genome was evaluated by examining disruption of the E2 gene and by sequencing of human/viral hybrid mRNAs.

Results: The most common tumor sites were the tongue (17.5%) and the tonsils (16.4%). HPV was identified in 19.2% of the tumors, with HPV-16 identified in 29 cases, HPV-18 in one case, and HPV-33 in four cases. HPV was found in 58.6% (17/29) of the tonsil tumors. HPV was more likely to be seen in poorly differentiated squamous cell carcinomas ($p=0.0007$). The tumors from younger patients were more likely to have HPV. Later TNM clinical stages were more likely to contain oncogenic HPV ($p=0.0068$). Three HPV-16 positive cases (17.6%) had deletions in the E2 gene, suggesting integration into the DNA. HPV16 E6/E7 expression was seen in two tonsil tumors, both of which integrated.

Conclusion: Infection by oncogenic HPV is a common occurrence in oral cancer, especially in the posterior oral cavity. The demonstration of viral integration and oncogene expression suggests that oncogenic HPVs may play a significant role in carcinogenesis and cancer progression, especially in the posterior oral cavity. This research was supported by a VA Dental Research Fellowship Award, NIH-NIDR 1 RO1 DE11979-01, and an NIH-NIDR Dentist Scientist Award.

Taylor, Erin

Oral, IASD

Attitudes of Women College Athletes Toward the Use of Mouthguards: A Pilot Study.

TAYLOR, E., RANALLI, D.N., University of Pittsburgh, School of Dental Medicine, USA.

Introduction: Women athletes are at risk for all forms of injuries. Several factors may contribute to increased risk for orofacial injuries. These include: 1) increased participation by women since Title IX; 2) a predictive index that identified gender as a causal factor for athletic injuries; 3) prevalence data for female athletes in six college sports exceeded those in male college football players.

Purpose: This pilot study was designed to test a survey instrument to determine the attitudes of female college basketball players regarding the use of mouthguards.

Methods: The survey, which contained twenty-one questions pertaining to demographics, mouthguard utilization, and types of injuries received, was administered to the 2002-2003 University of Pittsburgh Women's Basketball Team. Data were analyzed using descriptive statistics.

Results: All of the women basketball players participated in the study except one ($N=14/15$, 93%). The average age in years was 20. Respondents reported participating in sports for an average of 14 years; the average participation in basketball for 10 years. Sixty-two percent ($N=8/13$) used the custom mouthguard and of those, none reported receiving a soft tissue injury, a facial fracture or concussion. Four players sustained a mouth injury involving the teeth, three of whom were not wearing a mouthguard.

Conclusions: This pilot study demonstrated that compliance was not perfect, but did provide baseline data to validate the questionnaire for future research in female athletes.

Int'l Acad for Sports Dentistry 19:(3)9, 2003.

Tyng, Ryan (1st Year)

Dean's Summer Student Research Scholar

A Lingering Challenge: Dentistry's Bout with Film and News Media

The goal of this project was to analyze the portrayal of dentists and the dental profession in film and news media. Several movies, television shows, and news events were compared and evaluated to find a common theme that has been bestowed upon the dental profession over the last century. The information was then used in conjunction with several published journal articles to show the negative effect that these public images have had on the oral health of the public, the attitudes and job satisfaction of dentists, and the future of dentistry and its relationship with the public.

Film and news have been found to significantly influence the views and actions of the general public and dentists. Recent movements by the profession have led to more positive views, but the responsibility for permanent change lies on the shoulders of each individual dentist and their methods of care.

Tooth Agenesis Associated with Polymorphisms in MSX1 and PAX9

VECCHIONE, L¹, HART P.S.², MICHALEC M.D.², GORRY M.C.², SCIOTE J.J.¹, and HART T.C.,¹ University of Pittsburgh, Pittsburgh, PA, USA, ² University of Pittsburgh, PA, USA

With recent advances in molecular biology and human genetics, the specialty of orthodontics now endeavors to identify genes associated with variations in craniofacial growth and dental development to better understand the etiology of dentofacial orthopedic conditions. Objective: To identify genetic polymorphisms in the transcription factor genes MSX1 and PAX9 in individuals with dental agenesis. These polymorphisms were compared within family members and to control subjects. Methods: DNA samples were obtained from 10 subjects with dental agenesis and 35 controls from the orthodontic & pediatric clinics at the University of Pittsburgh. PCR primers were designed to amplify the entire coding regions of the MSX1 and PAX9 genes. The PCR amplification products were sequenced using BigDye terminator chemistry and an ABI 3700 DNA Analyzer. The sense and antisense strand of each PCR product was directly sequenced and compared to genomic reference sequences (GENBANK). Results: Sequence analysis identified three single nucleotide polymorphisms (SNPs) in tooth agenesis patients: two in MSX1 (exon 1 and exon 2) and one in PAX9 (exon 3). A C-T transition in MSX1, resulting in an A34G substitution, was found in 2 patients and in 14% of controls. A second MSX1 SNP, a C-G transversion resulting in an R170G substitution, was found in 3 affected individuals. This SNP was not found in controls. Sequencing of PAX9 revealed a G-C transversion, resulting in an A232P substitution, in 80% of affecteds. This SNP was also present in 50% of controls. Conclusions: We have identified 3 SNPs that result in amino acid changes in the 2 genes that have been reported to have mutations associated with hypodontia. Two of these SNPs are also present in controls, suggesting they may be common gene variants. One MSX1 SNP, R170G, was identified only in tooth agenesis patients with affected incisors and may be etiologically important.

web-J Dent Res: Abstract #1256

Cephalometric Measurements Differ with Masseter Muscle Fiber Type Characteristics

VECCHIONE L., SCIOTE J., RAOUL G., CLOSE J., ROWLERSON A., FERRI J.

Objective: This study examined the relationship between fiber type composition of masseter muscle and cephalometric measurements of vertical and sagittal dimension to determine the influence of muscle characteristics on craniofacial morphology.

Methods: Masseter biopsies were obtained in 31 subjects (3 Class I, 15 Class II and 13 Class III) with varying degrees of open and deep bite malocclusions, during surgical correction of malocclusion. Four fiber types (type I, type I/II hybrids, type II and type neonatal/atrial) were identified from protein isoform composition after immunostaining of biopsy sections with myosin heavy chain specific antibodies, and the mean area of the fiber types and the percent muscle composition for each fiber type (percent occupancy) were determined. Seventeen measurements of sagittal and vertical facial dimension were made utilizing cephalometric analysis software. A multiple regression analysis was used to define the best set of cephalometric predictors for mean fiber area and percent occupancy.

Results: Of the 17 cephalometric measures 11 were found to be predictive of fiber type area or percent occupancy in masseter muscle. These values were distributed among sagittal (S), vertical (V) or sagittal and vertical (S + V) measurements as follows:

	Mean Area	S	V	S+V	% occupancy	S	V	S+V
I		1	5	1		0	1	0
I/II		2	2	1		0	0	0
II		1	3	1		0	3	0
Neo/Atrial		0	1	0		0	0	0

Vertical cephalometric measurements were more predictive of fiber types and mean fiber areas correlated more closely with cephalometric measurements than fiber type percent occupancy. The most common predictor of fiber type, obtaining significance five times, was the measure Frankfort horizontal to the sella nasion plane.

Conclusion: We conclude that the fiber type composition of masseter muscle may be related to vertical and sagittal aspects of craniofacial morphology.

web-J Dent Res: Abstract #2642 (2004)

Vergona, Kathleen D.

Poster, IADR/AADR (2000 Annual Meeting)

Oral Health of Older Adults in Rural Urban Communities

VERGONA, K.D., GALLAGHER, J.E., HUGHES, P.L.¹. *University of Pittsburgh and ¹ Tug River Health Association, McDowell County, West Virginia.*

Interest in access to quality dental services and its impact on oral health has been generated by the Healthy People 2010 agenda and the Surgeon General's Report on Oral Health. The purpose of this study was to compare the oral health of older adults living in a rural community (R) with their age-matched cohorts residing in an urban setting (U). In addition, participants (n=311) completed a survey designed to gather information about their medications, oral health complaints, means of transportation to the site of dental treatment, and frequency of visits to the dentist or dental/hygienist. All respondents were at least 65 yrs of age. Data from this assessment revealed marked differences in edentulism between these two groups: 13% (R) vs. 50% (U); and means of transportation to the dental office: 90% by own care (R) vs. 27% (U). The two most common diseases in both populations were arthritis (50% R; 47% U) and high blood pressure (66% R; 35% U). While every urban respondent was taking at least one medication, 25% of the rural residents reported that they were not taking medications. Dry mouth was a complaint reported by most of the rural (66%) and urban (55%) participants. Burning tongue was a less common problem, reported by only 9% of the rural dwellers and 15% of the urban population. The majority (55%) of the rural participants had not visited a dentist or hygienist for more than two years, while most (56%) urban dwellers reported going to the dentist at least once in the last two years.

Weinberg, Seth

Poster, ASHG
Platform, SCG

Genome Scan of Cleft Lip With or Without Cleft Palate (CL/P). Broadening the Phenotype to Include Lip Muscle Defects.

WEINBERG, S.M., NEISWANGER, K., MOONEY, M.P., COOPER, M.E., GOLDSTEIN, T.H., BOWEN, A., MARTIN, R.A., **MARAZITA, M.L.**

To date, genetic studies of CL/P have defined affection status narrowly, resulting in a potential loss of power for gene mapping studies if there are sub-clinical phenotypes present in non-cleft carriers of CL/P susceptibility genes. Studies using ultrasound have found a higher frequency of subclinical defects in the upper lip muscles of non-CL/P individuals within CL/P families compared to controls. A genome wide scan using 392 markers, with average spacing of 8.9 cM, was performed on 24 CL/P multiplex families from Western Pennsylvania (122 family members genotyped by CIDR). Analyses were performed for both narrow and broad affection status definitions, with the broad definition including both overt CL/P plus subclinical lip muscle defects. There were 36 affected family members under the narrow definition, and 44 under the broad. Two-point and multipoint parametric linkage analyses were performed by the method of LOD scores. Results of the genome scan under the narrow affection status definition found suggestive LOD scores (between 1 and 2) on chromosomes 2, 6, 7, 8, 10 and 18. The highest two-point LOD was 1.97 on Chr 2. The highest multipoint LOD was 1.36 on Chr 6. Results of the genome scan with the broad affection status differed substantially. LODs greater than 1 were seen on chromosomes 1, 2, 5, 6, 8, 10, and 17. The highest two-point LOD was again found on Chr 2, but the LOD increased to 2.32. The highest multipoint LOD was 1.83 on Chr 17. Compared to the results of the narrow definition scan, seven LODs increased to over 1, seven decreased to below 1 and three initially over one increased further. These results suggest that several of the genes responsible for CL/P also lead to lip muscle defects, and highlight the potential importance of including sub-clinical markers in gene mapping studies of CL/P. Supported by NIH grants DE13076 & RR00084; genotyping was provided by a grant from the Center for Inherited Disease Research.

American Journal of Human Genetics 73(supplement):291, 2003.

Student Researchers and Their Mentors

<u>Student</u>	<u>Year</u>	<u>Mentor(s)</u>	<u>Department</u>
Acosta, Henry	4 th	Dr. Yahia Ismail	Restorative Dentistry
Antoniou, Alexandru	1 st	Dr. Heiko Spallek	Dental Informatics
Carnaggio, Thomas	4 th	Dr. Yahia Ismail	Restorative Dentistry
DeCaria, Alene	4 th	Dr. John Close and Dr. Kenneth Etzel	Dental Public Health
Gray, Benjamin	3 rd	Dr. Velpandi Ayyavoo	Infectious Diseases & Microbiology GSPH
Hanzon, Jeffrey	4 th	Dr. Mark Mooney and Dr. Robert Gassner	Oral Medicine and Pathology
Karam, Joseph	2 nd	Dr. Charles Sfeir and Dr. Nicholas Piesco	Oral Medicine and Pathology
Kim, King	4 th	Dr. Thomas Hart and Dr. Mary Marazita	Oral Biology Cleft Lip-Cleft Palate
Kogan, Diana	4 th	Dr. Robert Weyent, Dr. Bobby Collins, and Dr. Michael Shurin	Dental Public Health/Oral Medicine and Pathology
Liang, Kai-Ying	4 th	Dr. Sharon Wenger	West Virginia University
Lin, Lu-Tien	1 st	Dr. Charles Sfeir	Oral Medicine and Pathology
Modic, Paul	4 th	Dr. Michael Cuddy	Anesthesia
Mullins, Laura	graduated	Dr. Richard Crout and Ms. Shari Austin	West Virginia University
Roccia, Wayne	4 th	Dr. Michael Cuddy	Anesthesia
Schaefer, Adam	4 th	Dr. Walter Bretz and Dr. Pouran Famili	Dental Public Health/Periodontics
Shumate, Dana	4 th	Dr. Hal Reed	West Virginia University
Tyng, Ryan	1 st	Dr. Nina Markovic Margaret Kuder Hamilton	Dental Public Health

SPRING RESEARCH SYMPOSIUM – POSTER DISPLAY

	Name	Poster	
1	Acosta, et al	An Analysis of Pre Clinical Preparations for Fixed Partial Dentures	Poster, IADR/AADR/CADR
2	Bezack, et al	Recruitment and Retention of Underrepresented Population Groups in Dental Hygiene	Poster, ADEA
3	Brandon, et al	Evidence of Unique Dermatoglyphic Phenotypes in Nail Patella Syndrome	Poster, ASHG
4	Bretz, et al	Dental Caries and Microbial Acid Production in Twins	Poster, IADR/AADR/CADR
5	Carnaggio, et al	An Analysis of Pre-Clinical Preparations for Fixed Partial Dentures	Poster, IADR/AADR/CADR
6	Crout, et al	Cardiovascular Risk Evaluation of Families in a Rural WV Population	Poster, IADR
7	DeCaria, et al	Do You Practice What You Preach?	Poster, ADEA
8	Famili, et al	Relationship Between Periodontal Disease Tooth Loss and Rate of Bone Loss in Older Women	Poster, AIDR
9	Gray, et al	Novel Vector Design to Express Multiple Antigens	Dean's Summer Student Research Scholar, Poster
10	Hanzon, et al	Guided Tissue Regeneration Using Osteoinductive Polyurethane Membranes in Rabbit Maxillary Osteotomies	T-35 Short-Term Dental Student Research Training Program Poster, IADR/AADR/CADR
11	Kogan, et al	Loss of Chemokine CSCL ₁₄ Expression in Oral Squamous Cell Carcinoma (SCC) as a New Mechanism of Tumor Escape from Immune Recognition	T35 Short-Term Dental Student Research Training Program Poster, IADR/AADR/CADR
12	Lueng, et al	Fixed/Removable Full Arch Implant-Supported Prosthesis: Analysis of Published Data	Poster, IADR/AADR/CADR
13	Liang, et al	Chromosome Abnormalities in Multiplex Families with Cleft Lip/Palate	Poster, IADR/AADR/CADR
14	Lin	Amelogenin Splice Produce Regulates Gene Expression in Mineralized Cells	Dean's Summer Student Research Scholar, Poster, IADR/AADR/CADR
15	Maher, et al	Dopamine System Genes and Human Motor Activity	Poster, ASHG
16	Mooney, et al (Poster – Mooney)	Anti-TGF- β 2 Antibody Inhibits Postoperative Resynostosis in Craniosynostotic Rabbits (Pgh. Bone Symposium) (Conf. on Oral & Maxillofacial Surgery)	Poster, PBS, Oral, ICOMS
17	Mooney, et al (Poster – Caccamese)	Bone Morphogenic Proteins (BMPs) in the Perisutural Tissues in the Craniosynostotic Rabbit	Poster, PBS
18	Mooney, et al (Poster – Dunlavy)	FGF-Receptor Expression in the Perisutural Tissue of Craniosynostotic Expression	Poster, IADR, AADR
19	Mooney, et al (Poster – Cooper)	Muscle-Derived Stem Cells Expressing Noggin Inhibit Cranial Defect Healing (Presented Orthopaedic Research Society) (Presented Hawaii)	Paper, IADR/AADR/CADR, Poster, ORS
20	Mooney, et al (Poster - Morrison)	Rescue of Premature Coronal Suture Fusion with Tgf- β 2 Neutralizing Antibody in Rabbits with Delayed Onset Synostosis	Paper, ACPCA
21	Mullins, et al	Oral Health and Overall General Health: High School Awareness	Poster, IADR/AADR/CADR
22	Neiswanger, et al	Genome Scan of Cleft Lip With or Without Cleft Palate (CL/P): Part II: Broadening the Phenotype to Include Velopharyngeal Incompetence (VPI)	Poster, ASHG

Continued

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23	Polk, et al	Independent Associations of Objective and Subjective Social Status with Caries	Poster, APS
24	Roccia, et al	Automated External Defibrillator Use Among the General Population	Poster, IADR/AADR/CADR
25	Schaefer, et al	Study of the Effect of Tacrolimus vs. Cyclosporine on Gingival Overgrowth	Poster, IADR/AADR/CADR
26	Scott, et al	Dermatoglyphics in Filipinos with Nonsyndromic Cleft Lip With or Without Cleft Palate (NS CL/P) and Their Relatives	Poster, ASHG
27	Shumate, et al	A Comparison of Panoramic and Cross-Sectional Radiography in the Evaluation of Implant Selection and Placement	Poster, ADEA
28	Tyng, et al	An analysis on the Treatment of Dentists in Film and News Media	Dean's Summer Student Research Scholar
29	Vergona, et al	Oral Health of Older Adults in Rural Urban Communities	Poster, IADR/AADR (Annual Mtg. 2000)
30	Weinberg, et al	Genome Scan of Cleft Lip With or Without Cleft Palate (CL/P). Broadening the Phenotype to Include Lip Muscle Defects	Poster, ASHG, Platform Presentation

SPRING RESEARCH SYMPOSIUM

Student Awards

Judging List – Monday, April 12, 2004

	Name	Poster	
1	Antoniou, Alexandru (1 st)	Development of a Formative Evaluation Method for an Adaptive Hypermedia Course	Oral
2	Carnaggio, Thomas (4 th)	An Analysis of Pre-Clinical Preparations for Fixed Partial Dentures	Poster
3	DeCaria, Alene (4 th)	Do You Practice What You Preach?	Poster
4	Gray, Benjamin (3 rd)	Novel Vector Design to Express Multiple Antigens	Poster
5	Hanzon, Jeffrey (4 th)	Guided Tissue Regeneration using Osteoinductive Polyurethane Membranes in Rabbit Maxillary Osteotomies	Oral
6	Kogan, Diana (4 th)	Loss of Chemokine CSCL ₁₄ Expression in Oral Squamous Cell Carcinoma (SCC) as a New Mechanism of Tumor Escape from Immune Recognition	Poster
7	Lin, Yu-Tien (1 st)	Amelogenin Splice Produce Regulates Gene Expression in Mineralized Cells	Poster/Oral
8	Roccia, Wayne (4 th)	Automated External Defibrillator use Among the General Population	Poster
9	Schaefer, Adam (4 th)	Study of the Effect of Tacrolimus vs. Cyclosporine on Gingival Overgrowth	Poster
10	Tyng, Ryan (1 st)	An Analysis on the Treatment of Dentists in Film and News Media	Poster

Presented by Mr. Ronald Rank, Dentsply:

Gray, Benjamin ADA Caulk/Dentsply Student Clinician Program
 Trip to the ADA 145th Annual Session, 09/30/04 to 10/04/04, Orlando, FL

Presented by Dr. Mark Mooney:

Dr. Kenneth Etzel National Student Research Group Faculty Advisor of the Year (plaque)
 Schaefer, Adam Troy AADR Pittsburgh Chapter Student Research Award (bronze plaque)
 Roccia, Wayne O. Jack Penhall Award 1st Place (\$100)
 Carnaggio, Thomas O. Jack Penhall Award 2nd Place (\$50)
 DeCaria, Alene O. Jack Penhall Award 3rd Place (\$35)

Presented by Beth Troy, President, ASDA:

Hanzon, Jeffery ASDA Award 1st Place (\$125)
 Kogan, Diana ASDA Award 2nd Place (\$50)
 Lin, Yu-Tien ASDA Award 3rd Place (\$25)

No competitors ASDA Dental Hygiene 1st Place (\$50)
 No competitors ASDA Dental Hygiene 2nd Place (\$35)

Judges: Dr. Bobby Collins
 Dr. Mark Mooney
 Dr. Paul Moore
 Dr. O. Jack Penhall

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