



University of Pittsburgh
School of Dental Medicine

Spring Research Symposium

Wednesday, May 13, 2009

9:00 – 11:30 a.m.
Lecture Room 3
4th Floor, Scaife Hall

**UNIVERSITY OF PITTSBURGH
SCHOOL OF DENTAL MEDICINE**

SPRING RESEARCH SYMPOSIUM

Wednesday, May 13, 2009

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School of Dental Medicine
9th Annual Spring Research Symposium

Wednesday, May 13, 2009
9:00 am – 11:30 am, Auditorium 6, 4th Floor, Scaife Hall

9:00 Welcome, Dr. Thomas W. Braun, Dean

9:15 Introduction, Dr. Mary L. Marazita, Associate Dean for Research

9:30 Invited Speaker – Dr. Rena D’Souza, Professor and Chair, Department of
Biomedical Sciences, Baylor College of Dentistry – *“Adventures from the Clinic
to the Bench and Back”*

2009 Dean’s Summer Research Scholarship Program

10:30 Introduction – Dr. Mark P. Mooney

10:35 Jeong Seon Kim, *“Involvement of Integrins in Phosphoryn Signaling in
Human Mesenchymal Stem Cells”*

10:45 Joseph Liu, *“Bioinspired Synthesis of Hard Tissue Repair Materials”*

10:55 Samir Singh, *“Rescue of Coronal Suture Fusion using TGF-beta 3 Non-
viral Plasmid DNA Gene Therapy in Rabbits with Delayed Onset Synostosis”*

11:05 Student Research Awards Presentations – Dr. Mark Mooney
Mr. Michael Norton to award the ADA Caulk/Dentsply Student Clinician Award

Faculty Research Presentations

11:10 Dr. Alejandro Almarza, *“Current Research on TMJ Tissue Engineering”*

11:20 Dr. Elia Beniash, *“Bio-inspired Materials for Hard Tissue Repair and
Regeneration”*

11:30 Dr. Karen Cuenco – *“Blame at Least some of it on Your Parents: The
Complexity of Genes, Oral Bugs, and Cavities”*

11:40 Poster Presentations & Interactions – Room 457 Salk

12:00 Refreshments – Room 402 Salk

The Symposium will be followed by the Senior Awards Ceremony in Room 402

Adventures from the clinic to the bench and back

Rena N. D'Souza, DDS, PhD

Professor and Chair, Department of Biomedical Sciences
Baylor College of Dentistry, Texas A&M health Science Center, Dallas

Tooth development is largely under genetic control and all familial cases as well as the majority of sporadic cases of congenital tooth agenesis are likely to be caused by sequence variations in one of the many genes that are involved in tooth development. That the patterning of dentition is under strict genetic control is proven by disorders affecting the size, shape and number of human teeth. A better understanding of the molecular mechanisms that lead to normal and abnormal tooth formation is of great interest as such information can be translated into regenerative strategies for tooth replacement.

This talk will review classic and current literature on tooth development and highlight key questions that remain. Genes and their underlying mutations that lead to the congenital absence of teeth (tooth agenesis or hypodontia) will be overviewed. The distinction between syndromic and non-syndromic tooth agenesis is becoming less apparent as genetic knowledge advances. Not only do the more "tooth-specific" genes contribute to non-dental problems, but the reverse has also been observed. Results of our studies on a novel mutation in the Ectodysplasin A (*EDA*) gene that is responsible for selective, non-syndromic tooth agenesis will be presented. Data from *in vitro* functional analysis of one novel and five known *EDA* mutations will be shown to introduce the hypothesis that anterior teeth requires the highest level of *EDA*-receptor signaling while other ectodermal appendages, including most posterior teeth have less stringent requirements.

Finally, new biochemical and molecular approaches used in our laboratories to elucidate the underlying mechanism of non-syndromic tooth agenesis involving *PAX9* and *MSX1* genes will also be discussed. The talk will conclude with a forecast of future strategies that can be used to better predict genotype-phenotype correlations for hypodontia. Furthermore, these studies underscore the importance of diligent phenotype characterization and classification in uncovering the underlying genotype.

This research is supported by NIH grants R01-DE019471, R01-DE13368 to RDS and U24-DE16472 to Baylor College of Dentistry.

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Past Guest Speakers

- 2008** Dr. Mary B. MacDougal, University of Alabama at Birmingham, Institute of Oral Health Research: "Genetic Lessons for Growing Teeth."
- 2007** Dr. Brian Schutte, University of Iowa, Department of Pediatrics, Department of Cardiology: "Mining the Pits: Genetic Lessons from Van der Woude Syndrome."
- 2006** Dr. Ken Muneoka, Tulane University, Department of Cell and Molecular Biology: "Human Digit Regeneration: Developing a Roadmap."
- 2005** Dr. Jeffrey C. Murray, University of Iowa, Department of Pediatrics: "From the Clinic to the Bench and Back: Craniofacial Anomalies."
- 2004** Dr. Arthur Veis, Northwestern University Medical School, Department of Cell and Molecular Biology: "Relationships between Amelogenesis and Odontogenesis during Tooth Maturation."
- 2003** Dr. George Stookey, Indiana University School of Dentistry, "New Technologies for Caries Detection and Control."
- 2002** Dr. Raymond P. White, University of North Carolina: "Pathology with Retained 3rd Molars."
- 2001** No Guest Speaker

Involvement of Integrins in Phosphoryn Signaling in Human Mesenchymal Stem Cells

Janice Kim (Yr 1)

Dean's Summer Scholarship Recipient

Charles Sfeir, PhD (Mentor)

Objective: Our goal is to study the signaling mechanisms of stem cell differentiation into the osteogenic/odontogenic lineages by extracellular matrix (ECM) proteins phosphoryn (PP).

Methods: Human mesenchymal stem cells (hMSCs) were cultured in Alpha-MEM supplemented with 16.5% fetal bovine serum and 1% penicillin/streptomycin. Recombinant phosphoryn were purified in our lab. To study whether integrins had an effect on mitogen activated protein kinases (MAPK), integrins will be blocked by anti- $\alpha\beta3$ and anti- $\alpha2\beta1$ followed by PP treatment. Cell lysates were collected for western blot analysis.

Results: Our data shows that PP signals through integrins $\alpha\beta3$ and $\alpha2\beta1$ to downstream MAPK. When integrins were blocked, MAPK (p-ERK, p-JNK, p-p38) activation by PP was inhibited.

Conclusions: PP plays a signaling role in addition to its well-established role in matrix mineralization. The signaling role of PP controls specific gene expressions in the cell nucleus. This data demonstrated the importance of integrin involvement in PP signaling for understanding the ECM-stem cell interaction and ECM-directed stem cell differentiation.

Bioinspired Synthesis of Hard Tissue Repair Materials

Joseph Liu, (Yr 1)

Dean's Summer Scholarship Recipient

Elia Beniash, Ph.D., Mentor

Introduction: The need for adequate hard tissue repair materials is great in the medical world. Currently used ceramic or metallic bone replacement materials suffer drawbacks that include loss of biocompatibility, lack of absorbability, and difference in mechanical properties. Bone is a hierarchically structured nano-composite material with unique mechanical properties and is composed of 70% carbonated apatite ($\text{Ca}_{10}(\text{PO}_4 \text{CO}_3)_6(\text{OH})_2$), 27% collagen, and 3% non-collagenous proteins (NCPs). While collagen acts as a template and bioapatite as a structural unit, NCPs play a crucial role in controlled deposition of the mineral. Understanding the formation of bone and applying this knowledge is crucial for the design of materials for hard tissue repair.

Objectives: The aim of this project is to use the pre-existing knowledge to design bulk materials for bone repair using polyaspartic acid as a mimic of NCPs and amorphous calcium phosphate (ACP) as the precursor for hydroxyapatite to achieve mineralization of collagen fibrils similar to that seen in bones. The composite is also tested for biocompatibility and mechanical properties.

Methods: ACP, preassembled collagen fibrils, and poly-L-aspartic acid (PD) were used to prepare composite pellets which were incubated in PBS buffer for collagen mineralization. In order to recreate the proportions in bone, the pellets were made with ACP, preassembled collagen fibrils, and poly-L-aspartic acid (PD) in weight ratios of (70:27:3), (70:29:1), and (70:29.5:0.5) respectively. A homogeneous mixture of all the components was obtained by cryogrinding and pellets were pressed using a pellet-press apparatus. The microhardness values of the pellets were tested using micro-indentation, and the biocompatibility of the resultant material was tested using MC3T3 cells.

Results: The mechanical properties of the pellets with ratios of ACP, collagen, PD of (70:27:3) were ~0.4 GPa in dry and ~3.0 GPa in wet conditions. Biocompatibility studies showed that pellets with ACP prepared at pH 11 did not support cell growth. However, pellets with ACP prepared at pH 8 showed cell attachment and proliferation of about 20% as compared to the control.

Conclusions: The mineralization of collagen occurred similarly to that in bone and dentin. Also, mechanical properties of the pellets were comparable to that of woven bone. Further research should be emphasized on improving mechanical properties and cell adhesion/proliferation of cells on the pellets.

Samir Singh (Yr-1)

Dean's Summer Scholarship Recipient

Mark P. Mooney, Ph.D., Mentor

Rescue of Coronal Suture Fusion using TGF- β 3 Non-Viral Plasmid DNA Gene Therapy in Rabbits with Delayed Onset Synostosis: a Pilot Study. S. Singh, G. DeCesare, T. Barbano, J.J. Cray, G.M. Cooper, J. Losee, M.I. Siegel, A.M. Moursi, M.P. Mooney

Objectives: 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 underexpression of transforming growth factor β 3, an osteoblast proliferation inhibitor, may be related to premature suture fusion (craniosynostosis) in a rabbit model. Furthermore, recent studies have demonstrated that introducing TGF- β 3 can prevent or "rescue" fusing sutures in a rabbit model with craniosynostosis. Although craniosynostotic rabbits treated with high doses of TGF- β 3 exhibited greater sutural widths than untreated control groups, this treatment exhibited transient effects due in part to the short half life of the TGF- β 3 protein. A possible solution to this problem is the use of gene therapy. The present pilot study was designed to test the hypothesis that TGF- β 3 DNA incorporated into a non-viral plasmid and delivered in a slow-absorbing collagen vehicle could "rescue" fusing coronal sutures and improve craniofacial growth in a rabbit model of familial craniosynostosis.

Methods: Seventeen New Zealand White rabbits with delayed-onset familial coronal suture synostosis were randomly assigned to three groups: 1) Surgical control group (n=10); 2) Collagen vehicle + Empty pCMV6-XL5 Plasmids – Vehicle Control Group (15 μ g/suture) (n=3), and; 3) Collagen vehicle + Human TGF- β 3 gene in pCMV6-XL5 Plasmids (15 μ g/suture) (n=4). At 10 days of age, all rabbits had radiopaque dental amalgam markers placed on either side of the coronal sutures. At 25 days of age the empty plasmid (pCMV6-XL5) and the plasmid with the TGF- β 3 DNA were mixed in a slow-release collagen vehicle and injected subperiosteally onto each coronal suture of the Vehicle Control and Experimental Groups respectively. Longitudinal head radiographs, somatic growth and skeletal growth data were collected from each animal at 10, 25, 42, and 84 days of age (an age at which 80-90% of brain growth is complete).

Results: Cephalometric analysis of the radiographs revealed that rabbits treated with human TGF- β 3 had no significant differences in coronal suture marker separation, cranial base length, and craniofacial length at any time period compared to control rabbits.

Conclusions: These pilot data do not definitively support our hypothesis that human TGF- β 3 gene incorporated into a non-viral plasmid and delivered in a slow-absorbing collagen vehicle "rescued" fusing coronal sutures and improved craniofacial growth in a rabbit model of familial craniosynostosis. Some possible reasons for these results may be due to: small sample sizes; poor transfection efficiency; the premature collection of data prior to the maximal therapeutic effects of the treatment; faulty delivery of the plasmid from the collagen vehicle; or the plasmid being delivered past the time frame of effective treatment (i.e., after synostosis). Additional data are needed to assess the efficacy of this treatment.

Current Research on TMJ Tissue Engineering

Alejandro Almarza, Ph.D.

TMJ Laboratories; Department of Oral Biology; University of Pittsburgh

Introduction: Cell behavior is directed by spatial and temporal cues from their extracellular matrix (ECM). Current tissue engineering therapy approaches are based on biomimetic extracellular matrices (bECMs) integrated with specific growth factors or seeded with cells to promote and guide tissue regeneration metered by bECM biodegradation. These approaches have been applied to several tissues such as bone, cartilage, ligament, teeth and the fibrocartilage of the temporomandibular joint (TMJ).

These tissue engineered approaches usually consist of a homogenous matrix incorporating a uniform distribution of protein, DNA or cells. Proteins or DNA are either adsorbed or absorbed (randomly or uniformly) into the matrix and the cells are seeded onto the matrix. These designs do not provide the three dimensional (3D) spatial patterns and temporal control of growth factors required to recapitulate wound healing or tissue formation.

For the rationales presented above, we believe that there is a critical need to gaining spatial and temporal control over the delivery of signaling molecules and cells. In addition, the deposition of the combination of cells with growth factors or different types of cells or different types of growth factors will provide an important biological model to study tissue development and growth.

Goals: Our short term goal is to develop the necessary technologies to achieve 3D printing and apply it to study the cellular interactions of human mesenchymal stem cells (MSCs) with patterned biodegradable constructs containing growth factors known to influence the bone-fibrocartilage interface development.

Printing with the computer aided design (CAD) enables a controlled architecture of cells and patterning of proteins, such as Figure 1. We hypothesize that by using 3D printing technologies, we will control the deposition of MSCs and growth factors, which can be used as a model to better understand interface tissue.

Objectives: The first objective is to test two materials (magnesium, and special formulation bone cement) for their ability to achieve the compressive properties of bone, which are typically in the Giga-Pascal range, and the differentiation of MSCs to bone cells.

The second objective is to test three hydrogels (collagen, starch, gelatin) for their ability to achieve the compressive properties of cartilage, which are typically in the Mega-Pascal range, and the differentiation of MSCs to cartilage cells.

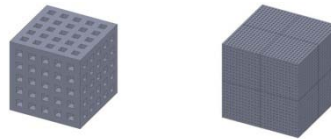


Figure 1. Computer aided Design of controlled porous architecture for seeding cell in tissue engineering approach.

Bio-inspired Materials for Hard Tissue Repair and Regeneration

Elia Beniash, PhD

Biomaterials are playing an increasingly important role in tissue repair and regeneration applications. Significant improvements have been made in this field, yet the properties of modern biomaterials for hard tissue regeneration are not optimal due to the difference in functional, structural and compositional properties of these materials and the target tissues. Hence, there is a growing need in novel design strategies for materials that closely resemble structural and mechanical properties of biological tissues in the field of hard tissue regeneration. Mineralized tissues such as enamel, dentin and bone are nanostructured organo-mineral composites organized at several hierarchical levels starting from nanoscale. These tissues are self-healing materials which are able to perform under severe mechanical and chemical stresses for decades. In recent years, a bioinspired approach to development of design strategies toward biomaterials is gaining. Such an approach is based on the deep understanding of basic strategies of tissue formation and application of these strategies to the materials design.

We are currently developing new approaches to biomaterials design using collagenous mineralized tissues as an inspiration. Specifically we are designing nano-composite materials for mineralized tissue repair using biological macromolecules, as well as their mimics, and different calcium phosphate mineral phases. We anticipate that these studies will lead to the development of novel biomaterials for tissue repair and regeneration.

Blame at Least some of it on Your Parents: The Complexity of Genes, Oral Bugs,
and Cavities

Karen T. Cuenco, Ph.D., MS

Our understanding of the role of oral microbes and their effect on caries has been evolving. *Streptococcus mutans* colonization is viewed as a major determinant of caries. More recent evidence suggests that other flora in addition to *S mutans* may affect caries development. *S mutans*, periodontal-related flora, and common nosocomial infections existing either in the throat or oral cavity have been assessed in residents of the Appalachian region. The association between *S mutans* and caries was mild. However, joint assessment of multiple microbial organisms revealed that aggregate microbes increased the odds of high caries when *S aureus*, periodontal infectious agents, or *Candida* was present. Additional results suggest that oral microbial profiles are under genetic influence. These findings highlight the importance of looking at multiple organisms from multiple sites simultaneously and host genetic variation to identify individuals at high risk for caries.

Presentations on the following pages are associated with the meetings listed below:

Abbreviation	Dates	Title	City
AAFA	February 2009	American Academy of Forensic Anthropology	Denver, CO
ALD	April 22-25, 2009	The Academy of Laser Dentistry's 16 th Annual Conference and Exhibition	Las Vegas, NV
ACAD OSSEOINT	February 26-28, 2009	Academy of Osseointegration	San Diego, CA
ATACC	August 11-13, 2008	Advanced Technology Applications for Combat Care	St. Petersburg, FL
AAP	September 5-9, 2008	American Academy of Periodontology	Seattle, WA
AADR	April 2-5, 2008	American Association for Dental Research	Dallas, TX
AAE	April 29-May 2, 2009	American Association of Endodontists	Orlando, FL
AAPA	March 31-April 4, 2009	American Association of Physical Anthropologists	Chicago, IL
ACPA	April 20-25, 2009	American Cleft Palate-Craniofacial Association	Scottsdale, AZ
ACPCA	April 16-19, 2008	American Cleft Palate-Craniofacial Association	Philadelphia, PA
ADEA	March 14-18, 2009	American Dental Education Association	Phoenix, AZ
ADHA	June 17-23, 2009	American Dental Hygienists Association	Washington, DC
AM DIABE ASSOC	June 6-10, 2008	American Diabetes Association	San Francisco, CA
APS	March 12-15, 2008	American Psychosomatic Society	Baltimore, MD
APS	March 4-7, 2009	American Psychosomatic Society	Chicago, IL
ASDA	April 1, 2009	ASDA Ethics Symposium	Pittsburgh, PA
ASHG	November 11-15, 2008	American Society of Human Genetics	Philadelphia, PA
ASPS	October 31-November 5, 2008	American Society of Plastic Surgeons	Chicago, IL
ASME	June 7-11, 2008	ASME Int'l Mechanical Engineering Congress & Exposition	Lake Buena Vista, FL
ASME	October 2008	ASME Int'l Mechanical Engineering Congress & Exposition	Boston, MA
ABCT	November 13-16, 2008	Association for Behavioral and Cognitive Therapies	Orlando, FL
DIRC	April 6, 2009	Dental Informatics Research Challenges	Pittsburgh, PA

Abbreviation	Dates	Title	City
Dept for Biomed Informatics	October 17, 2008	Dept for Biomedical Informatics, Brown Bag Seminars	Pittsburgh, PA
FASEB	April 2009	Annual Meeting of FASEB	New Orleans, LA
EHGC	May 31-June 3, 2008	European Human Genetics Conference	Barcelona, Spain
EFW	October 27, 2008	3 rd Expert Finder Workshop on Personal Identification and Collaboration	Karlsruhe, Germany
1 st EXP RES	April 16, 2008	First Experiences in Research	Pittsburgh, PA
GSA	November 21-25, 2008	The Gerontological Society of America's 2008 Annual Meeting	National Harbor, MD
GCEE	October 19-23, 2008	Global Colloquium on Engineering Education (ASEE)	Cape Town, South Africa
GRC	August 10-15, 2008	Gordon Research Conference	New London, NH
HFFCCB	February 11, 2009	Health and Faith Forum, Center for Christian Bioethics	Loma Linda, CA
Hlth Inf Mgt	October 27, 2008	Health Information Management in the Non-Traditional Setting Lecture Series	Pittsburgh, PA
Hinman	October 31-November 2, 2008	Hinman Student Research Symposium	Memphis, TN
HSC	April 22-23, 2008	HSC Research Day & Van Liere Convocation; Schools of Medicine, Nursing, Pharmacy, and Dentistry	Morgantown, WV
IEEE	October 8, 2008	IEEE eScience 2008, Workshop: Project Mgmt and User Engagement	Indianapolis, IN
ITCH	February 20, 2009	Proceedings of Information Technology and Communications in Health	Victoria, British Columbia
HCE	February 28, 2009	Integrative Seminar and Health Care Ethics	Pittsburgh, PA
IACDR	July 1-5, 2008	International American and Canadian Association for Dental Research	Toronto, ON
IADR	July 2-5, 2008	International Association for Dental Research	Toronto, ON
IADR/AADR	April 1-4, 2009	International Association for Dental Research	Miami, FL
IADR-Brazil	August 30-September 2, 2008	International Association for Dental Research – Brazilian Division	Águas de Lindóia, Brazil
MIRM	March 9-11, 2008	McGowan Institute for Regenerative Medicine	Nemacolin, PA
MTEC	April 2009	Midwest Tissue Engineering Consortium	Pittsburgh, PA

Abbreviation	Dates	Title	City
MTS08	October 2008	MTS08	Pittsburgh, PA
NOHC	April 26-May1, 2008	National Oral Health Conference	Miami, FL
NIDCR Trainee Poster Session	April 1, 2009	NIDCR Trainee Poster Session	Miami, FL
The Ohio Valley Society of Plastic Surgeons	May 2008	The Ohio Valley Society of Plastic Surgeons	Cleveland, OH
ORS	March 2-5, 2008	Orthopaedic Research Study	San Francisco, CA
ORS	February 22-25, 2009	Orthopaedic Research Study	Las Vegas, NV
PSRC	May 28-31, 2008	Plastic Surgery Research Council	Springfield, IL
Robert H. Ivy Society of Plastic Surgeons	April 11-12, 2008	The Robert H. Ivy Society of Plastic Surgeons	Valley Forge, PA
CON EDUC	November 21, 2008	School of Dental Medicine CE Potpourri Series #2	Pittsburgh, PA
PSRC	May 27-30, 2009	Plastic Surgery Research Council	Pittsburgh, PA
Postdoctoral Data and Dine	May 7, 2008	Postdoctoral Data and Dine Symposium	Pittsburgh, PA
Postdoctoral Data and Dine	May 19, 2009	Postdoctoral Data and Dine Symposium	Pittsburgh, PA
SB	April 2009	Society for Biomaterials	San Antonio, TX
SCG	November 11, 2008	Society of Craniofacial Genetics	Philadelphia, PA
University of Pittsburgh Musculoskeletal Research Center	February, 2008	5 th Symposium on the use of Extracellular Matrix as a Biological Scaffold for Tissue Reconstruction	Scottsdale, AZ

MEETING PRESENTATIONS

Abramowitch S, Redfern M, Debski R, **Almarza AJ**, Borovetz H, Woo SL-Y. *Intramural Research Internship: A Requirement of the Undergraduate Bioengineering Curriculum at the University of Pittsburgh*. (Short Paper) Global Colloquium on Engineering Education (ASEE), 2008.

Almarza AJ, Henderson SE. *Perspectives on TMJ Fibrocartilage Tissue Engineering*, Midwest Tissue Engineering Consortium, Pittsburgh, PA (April 2009).

Henderson SE, **Almarza AJ**. *Assessment of Mandibular Condylar Cartilage Shear Properties and Tissue Engineering using 3D Printing*, McGowan Institute of Regenerative Medicine Annual Retreat, Nemaquin, PA (March 2009).

Fisher MB, Zamorra G, Cirillo A, Liang R, **Almarza AJ**, McMahon PJ, Woo SL-Y. *Improved Healing of the Anterior Cruciate Ligament Following Genetically-Engineered Bioscaffold Treatment in the Goat Model*, 55th Annual Meeting of the Orthopaedic Research Society, Las Vegas, NV (February, 2009).

Woo SL-Y, Fisher FB, **Almarza AJ**. *Regeneration of Ligaments and Tendons by Application of Bioscaffolds*, Proceedings of the ASME International Mechanical Engineering Congress & Exposition, Boston (October 2008).

Almarza AJ, Woo SL-Y. *Functional Tissue Engineering of Ligaments and Tendons*, McGowan Institute of Regenerative Medicine Annual Retreat, Nemaquin, PA (March 2008).

Liang R, **Almarza AJ**, Nyugen TD, Woo SL-Y. *A Tissue Engineering Approach to Enhance the Healing of Ligaments*, McGowan Institute of Regenerative Medicine Annual Retreat, Nemaquin, PA (March 2008).

Almarza AJ, Augustine S, Woo SL-Y, *Effects of Ascorbic Acid Presence on the Gene Expression of Collagens of Medial Collateral Ligament Fibroblasts through Passages*, 54th Annual Meeting of the Orthopaedic Research Society, San Francisco, CA (March, 2008).

Woo SL-Y, **Almarza AJ**, Fisher MB, Liang R, *Biologic Effects of ECM Bioscaffolds for Ligament and Tendon Healing and Regeneration*, 5th Symposium on the use of Extracellular Matrix as a Biological Scaffold for Tissue Reconstruction. Scottsdale, AZ (February 2008).

Anderson DA, *Healthcare Ethics and the National Oral Health Agenda*, University of Pittsburgh School of Dental Medicine Continuing Education Potpourri Series #2 November 21, 2008.

Anderson DA, *Healthcare Ethics, Health Equity and the National Oral Health Agenda. Health and Faith Forum*, Center for Christian Bioethics, Loma Linda University, February 11, 2009.

Anderson DA, *HealthCare Ethics, Social Indicators of Health and the National Oral Health Agenda*, Integrative Seminar and Health Care Ethics, February 28, 2009. Sponsor: Angela Ford, Ph.D., Associate Director, Center for Minority Health Director, Community Engagement Core, Research Center of Excellence in Minority Health Disparities University of Pittsburgh, Graduate School of Public Health.

Anderson DA, *Healthcare Ethics, Health Equity and the National Oral Health Agenda*, ASDA Ethics Symposium, University of Pittsburgh School of Dental Medicine, April 1, 2009.

Bagby MD, Jackson C, Razmus T, Taylor N, Richey M. *Effects of Time and Irrigant on an MTA Apical Barrier*. Oral presentation, 87th General Session & Exhibition of the International Association for Dental Research (IADR)/38th Annual Meeting of the American Association for Dental Research (AADR), Miami Beach, FL, April 1-4, 2009.

Beniash E, Metzler R, Gilbert P. *Mineral Phases in Forming Enamel. Presented at the International Association of Dental Research, 86th general Session & Exhibition*, Toronto, Canada, July 1-5, 2008 and at the Gordon Research Conference (Biom mineralization), New London, NH, August 10-15th, 2008.

Beniash E, Deshpande AS. *Bioinspired Synthesis of Mineralized Collagen Fibril; the Basic Building Block of Dentin and Bone*. MTS08, Pittsburgh, PA, October 2008.

Bhanegaonkar AJ, Moffett ML. *Trends in Community-based Adverse Drug Events in the United States: 1996-2005*. Presented at the HSC Research Day & Van Liere Convocation; Schools of Medicine, Nursing, Pharmacy, Dentistry, April 22-23, 2008.

Bridge DR, Tweten RK, Olson JC. *The Role of Host Cell Adhesion Processes in Pseudomonas aeruginosa Type III Secretion*. Presented at the HSC Research Day & Van Liere Convocation; Schools of Medicine, Nursing, Pharmacy, Dentistry, April 22-23, 2008.

Clutter SL. *The Effects of an Educational Intervention on Nurse-Physician*

Collaboration and Compliance Rates with Quality Indicators for Cardiac Patients in Critical Care Settings. Presented at the HSC Research Day & Van Liere Convocation; Schools of Medicine, Nursing, Pharmacy, Dentistry, April 22-23, 2008.

Cooper ME, Wendell SK, Dilettuso BA, Kureichyk AL, Regina RL, Brown ML, Barkanic GE, Crout RJ, McNeil DW, Weyant RJ, Marazita ML. *Association Study of Candidate Genes for Dental Caries in Adults.* Oral presentation, 37th Annual American Association for Dental Research, April 2-5, 2008, Dallas, TX, J Dent Res 87(Spec Iss A): abs # 580, 2008 (www.dentalresearch.org).

Berk N, **Cooper ME**, Berk D, Resick JM, Brandon CA, Brown EP, Bardi KM, Middleton L, Marazita ML. *Characteristic Ratings of Subjects by Health Professionals Based on Auditory and Visual Information.* Poster Presentation, 65th Annual Meeting of the American Cleft Palate-Craniofacial Association, Philadelphia, PA, April 16-19, 2008.

Klotz CM, **Cooper ME**, McHenry TG, Neiswanger K, Marazita ML. *Familial Clustering of Superior Orbicularis Oris Muscle Defects in Families with Cleft Lip and Cleft Palate.* Poster presentation at the 58th annual meeting of the American Society of Human Genetics, Philadelphia, PA, November 11-15, 2008.

Brustolin S, **Cooper ME**, Silva A, Marazita ML, Santos MM, Giugliani R, Murray JC, Felix TM. *Folate Pathway Genes and Biochemical Studies in Orofacial Clefts.* Poster presentation at the 58th annual meeting of the American Society of Human Genetics, Philadelphia, PA, November 11-15, 2008.

Mansilla MA, Moreno LM, Busch T, Bullard SA, Machida J, **Cooper ME**, Jugessur A, Lie RT, Wilcox A, Christensen K, Chines P, Lidral AC, Marazita ML, Murray JC. *Association between FOXE1 and Cleft Palate.* Poster presentation at the 58th annual meeting of the American Society of Human Genetics, Philadelphia, PA, November 11-15, 2008.

Berk N, **Cooper ME**, Berk DL, Resick JM, Brandon C, Bardi K, Marazita ML. *First Impressions: Do Specialists in Cleft/Craniofacial Care Detect psychosocial vulnerability based on brief observational experiences?* Platform presentation, 66th Annual meeting of the American Cleft Palate-Craniofacial Association, Scottsdale, AZ, April 20-25, 2009.

Ozturk A, **Famili P**, Potluri A, Al-Shareef A, Vieira AR. *Position and Course of the Mandibular Canal: Panoramic Radiograph Analysis.* Abstracts of the 24th Annual Meeting of the Academy of Osseointegration, February 22-24, 2009, San Diego, CA.

Famili P, Miller C, Sattar MA. *Two-year investigation of the relationship between periodontal disease and sickle-cell anemia in an African-American adult population in Pittsburgh.* Oral presentation at the 87th Annual Session of the International Association for Dental Research, April 1-4, 2009, Miami, FL.

Famili P, Al-Jazzaf AH, Sattar A, Nelson C, Miller C. *Assessing the relationship between periodontal disease and sickle-cell anemia in an African-American adult population in Pittsburgh.* Poster presentation at the 86th Annual Session of the International Association for Dental Research, July 2-5, 2008, Toronto, Ontario, Canada.

Famili P, Gallagher J, Inks P, Kelly L, Short E. *Comparison of Methods of Oral Hygiene Instruction and Manual vs. Powered Brushing in Improving Gingival Health.* Presented at the American Dental Education Association 86th Annual Session and Exhibition, March 14-18, 2009, Phoenix, AZ and American Dental Hygienists Association 86th Annual Session and Exhibition, June 17-23, 2009, Washington DC.

Famili P, Al-Shuraidah A. *Compliance with dental implant maintenance regimens.* Academy of Osseointegration 24th Annual Meeting, February 26-28, 2009, San Diego, CA.

Bolden K, **Famili P**, Mozayan K. *Cortical Demineralized Freeze-Dried Bone (DFDB) with Human Laminar Bone for Alveolar Bone Preservation in Fresh Extraction Sockets.* Academy of Osseointegration 24th Annual Meeting, February 26-28, 2009, San Diego, CA.

Acharya P, Mota L, **Famili P**. *Revascularization Patterns Following Different Surgical Designs in Edentulous Areas.* Academy of Osseointegration 24th Annual Meeting, February 26-28, 2009, San Diego, CA.

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LIST OF POSTERS DISPLAYED

1	Acharya, Priya (Resident)	Revascularization Patterns Following Different Surgical Designs in Edentulous Areas	Acad Osseoint
2	Al-Shareef, Ahmad (Resident)	The Position and Course of the Mandibular Canal in Panoramic Radiography	Acad Osseoint
3	Al-Shuraidah, Abdullah (Resident)	Compliance with Dental Implant Maintenance Regimens	Acad Osseoint
4	Bolden, Kelly (Resident)	Demineralized Freeze-Dried one (DFDB) with Human Laminar Bone for Alveolar Bone Preservation in Fresh Extraction Sockets.	Acad Osseoint
5	Callahan, Nicholas (Student)	AXIN2 Contributes to Isolated Tooth Agenesis	IADR
6	Deshpande, Atul (Post-Doc)	Bio-Inspired Approaches to Design of Materials for Hard Tissue	MIRM
7	Deshpande, Atul (Post-Doc)	Bio-Inspired Synthesis of Mineralized Collagen Fibrils	Gordon Conference
8	Famili, Pouran (Faculty)	Assessing the Relationship between Periodontal Disease and Sickle-Cell Anemia in an African-American Adult Population in Pittsburgh	IADR
9	Gallagher, Judy (Faculty)	Comparison of Methods of Oral Hygiene Instruction and Manual vs. Powered Brushing in Improving Gingival Health	ADHA
10	Govil, Manika (Faculty)	Comparison of Family-Based Association Analysis Methods for SNP-haplotypes in Nuclear Families and Extended Kindred	ASHG
11	Henderson, Sarah (Student)	Assessment of Mandibular Condylar Cartilage Shear Properties and Tissue Engineering using 3D Printing	Bioengineering Conference
12	Karski, Matthew (Student)	Postoperative TGF- β 3 Protein Therapy Facilitates Craniofacial Growth in Rabbits with Craniosynostosis.	IADR/AADR
13	Kneib, Jared (Student)	Craniofacial Dysmorphology in GDF-8 (Myostatin)	IADR/AADR
14	Lam, Ray (Post-Doc)	Is Polymorphism the Answer to Tunable Delivery Profile?	MIRM
15	Letra, Ariadne (Faculty)	Interaction Between TGFA and IRF6 Genes Contributes to 1% of Total Nonsyndromic Cleft Lip/Palate	Univ. of Pittsburgh Science, 2008
16	Marazita, Mary (Faculty)	CRISPLD2 Assessed with Multiple Orofacial Cleft (OFC) Phenotypes in Multiple Ethnicities	ASHG
17	Menezes, Renato (Faculty)	AXIN2, Orofacial Clefts and Positive Family History for Cancer	Univ. of Pittsburgh Science 2008
18	Modesto, Adriana (Faculty)	Dental Trauma in Athletes Competing at the Para-Pan American Games	IADR
19	Mooney, Mark (Faculty)	Tgf-B2 antibody Therapy and ICV in Rabbits with Unicoronal Synostosis.	IADR/AADR

20	Morris, John (Student)	Intracranial Volume Calculated from Cephalometric Measures: Validity and Reliability.	IADR/AADR
21	Neiswanger, Katherine (Faculty)	Increased Non-Right-Handedness (NRH) and Less Hand Lateralization in Nonsyndromic Cleft Lip With or Without Cleft Palate (CL/P)	ASHG
22	Price, SS (Faculty)	Preparing Under-Represented Dental Students for Leadership Roles	ADEA
23	Raman, Aparna (Post-Doc)	Understanding the Basic Mechanism of Biomineralization: Towards Bioinspired Peptide Based Materials for Hard Tissue Regeneration".	MIRM
24	Robertson, Neil (Student)	Profiling of Stem Cell Differentiation with BMP-2 and Phosphophoryn	IADR
25	Rose, Erin (Undergrad Student)	Oral Health Assessment in the US within 150 Years	IADR
26	Sang, B. (Student)	A Quantitative Assessment of the Effect of Different Antimicrobial Therapies on Porphyomonas gingivalis Colonization on the Implant Surface: A SEM Study	ALD
27	Schleyer, Titus (Faculty)	Requirements for systems that optimize how biomedical scientists choose collaborators.	NCI/NCRI
28	Syed-Picard, Fatima (GSR)	Three-dimensional Scaffoldless Engineered Dentin: A Model to Study Dentinogenesis	NIDCR
29	Teng, Pang-Ning (GSR)	Signaling Mechanisms of Phosphophoryn in Human Mesenchymal Stem Cells	AADR
30	Thyvalikakath Thankam (Faculty)	Design of Electronic Dental Record Based on Clinicians' Cognitive Processes	IADR/AADR
31	Tropp, Steven (Undergrad Student)	CRISPLD2 C471T Silent Mutation May Contribute to Nonsyndromic Cleft Lip with or without Cleft Palate	Univ. of Pittsburgh Science, 2008
32	Vieira, Alexandre (Faculty)	Dental Anomalies are an Extended Phenotype of Orofacial Clefts	Univ. of Pittsburgh CTSI
33	Wang, Xiaojing (Faculty)	Genetic Factors Contribute to Dental Caries in the Primary and Mixed Dentitions in Appalachian Children	ASHG
34	Wu, Hong (Post-Doc)	Novel Calcium Phosphate Cement Based Scaffolds for Bone Tissue Engineering	AADR

Student Researchers and Mentors

Student	Year	Mentor	Department
Nicholas Callahan	3rd	Dr. Alexandre Vieira	Oral Biology
<i>Mutans Streptococci Detection in Human DNA Samples Extracted from Saliva</i>			
Matthew Karski	3rd	Dr. Mark Mooney	Oral Biology
<i>Postoperative Tgf- β3 Protein Therapy Facilitates Craniofacial Growth in Rabbits with Craniosynostosis</i>			
Jeong-Seon (Janice) Kim	1st	Dr. Charles Sfeir	Oral Biology
<i>Involvement of Integrins in Phosphoryn Signaling in Human Mesenchymal Stem Cells</i>			
Jared Kneib	2nd	Dr. Mark Mooney	Oral Biology
<i>Craniofacial Dysmorphology in GDF-8 (Myostatin) Deficient Mice</i>			
Joseph Liu	1st	Dr. Elia Beniash	Oral Biology
<i>Bioinspired Synthesis of Hard Tissue Repair Materials</i>			
John Morris	3rd	Dr. Mark Mooney	Oral Biology
<i>Intracranial Volume Calculated from Cephalometric Measures: Validity and Reliability</i>			
Neil Robertson	2nd	Dr. Charles Sfeir	Oral Biology
<i>Proteomic Profiling Of Stem Cell Differentiation With BMP- 2 And Phosphoryn</i>			
Samir Singh	1st	Dr. Mark Mooney	Oral Biology
<i>Rescue of Coronal Suture Fusion using TGF-β3 Non-Viral Plasmid DNA Gene Therapy in Rabbits with Delayed Onset Synostosis: a Pilot Study</i>			

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