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Bridging The Gaps
Abstracts
Student(s): Feiyi Guo

Title: Computer Teaching Program at LIFE (Living Independently for Elders)

Academic Preceptor(s): Joan I. Gluch and Zvi D. Gellis

Community Preceptor(s): Ingrid Sidorov

Community Site: LIFE (Living Independently for Elders)

Program Description: We taught LIFE (Living Independently for Elderly) members to use computers through hands-on instruction, advancing from basic skills such as using the keyboard and mouse to browsing the Internet. / / Objectives: To teach LIFE members to use the computers and their cell phones to help them independently communicate with families via email and text, access health information, stay up to date on current events and enhance cognitive fitness. / / Methods: We researched methods of teaching computer lessons to senior citizens and worked one-on-one with them on using computers and cell-phones. We provided step-by-step hands-on instructions to LIFE members while giving our undivided attention. In addition, we created a How-To booklet named Elders Online as a reference so members can ultimately use the computers on their own. / / Outcomes: We instructed over 30 LIFE members in computer and cell phone usage and taught over 70 hour-long lessons. The LIFE members showed improved computer literacy. They not only able to connect with family members and have fun doing computer activities, but also able to exercise their brains and hands by learning a new and challenging skill. At the same time, we gained knowledge on older adult care and the West Philadelphia community.
Student(s): Sierra van den Dries

Title: Earth's Keepers: Urban Farming in Southwest Philadelphia

Academic Preceptor(s): Dr. Joan Gluch, University of Pennsylvania School of Dental Medicine

Community Preceptor(s): Sister Alia Walker, Earth's Keepers Founder

Community Site: Earth's Keepers Urban Farm

Program Description: Three Penn graduate students from Medical, Social Work, and Dental Schools were assigned to work for seven weeks at Earth's Keepers, an organic urban farm in the heart of Southwest Philadelphia. The farm was run by Sister Alia Walker and six high school students from the community that are employed there. It is an organic haven on the grounds of the old Recreation Center, but to us, it is so much more than that. / / Objectives: nutrition education outreach to the community served by Earth’s Keepers. Include nutritional benefits and recipes of vegetables sold, Workshops for community, Garden support, Improve website, Include nutrition section, Update regularly with crops that are available each week, Quotes from current or previous students regarding their experience, Newsletter, Add a section for student of the week/month, Take pictures of the crops as they grow/sprout over the summer so we can show a series of progress pictures on the Website/newsletter, Donate section, Examples of what certain monetary amounts of donations can be used for ($10 = 5 strawberry seed packets, $20 = 1 pair of work boots for a student, etc.), Financial support. Seek material donations from businesses, Marketing, Little flyers around stores/restaurants/cafes in the area, Signage on the fence promoting the garden and the farmer’s market, Projects with students, College workshops and guidance sessions, Health workshops on our specific fields. / / Methods: We actuated a "Night on the Urban Farm" on August 7, 2014. We were able to utilize the community connections that Earth's Keepers gave us in order to acquire donations from local businesses, musicians, and many members of the Southwest Philadelphia Community. We had received plants and gift cards to give as raffle prizes, had a scavenger hunt through the farm for the children to identify nutrients in the vegetables that were growing, and were able to hold the farm's largest market to date, distributing produce to the food desert community for greatly reduced costs. In addition, the students that work on the farm manned stations pertaining to the various fields the BTG students specialize in, they became the teachers educating locals about the importance of cardiovascular, mental, and dental health. It was a night to remember! / / Outcomes: The event was a huge success, bringing in families from around the community and served as an opportunity to educate them on the importance of good nutrition, but also to bring the farm into the radar of the community so they are aware of the resource that they are able to take advantage of. Through the course of Bridging the Gaps, we won the poster contest, and the photo contest, but the experience gave us so much more than we ever could have imagined. I hope that we had half of the effect on our students as they had on us!
**Student(s):** Phoebe Sun

**Title:** Puentes Hacia el Futuro Summer Literacy Program

**Academic Preceptor(s):** Joan Gluch, Penn Dental Medicine and Ann O'Sullivan

**Community Preceptor(s):** Esther Morales, Puentes De Salud

**Community Site:** Puentes De Salud

**Program Description:** Puentes Hacia el Futuro (Bridges to the Future) is a summer literacy program run by Puentes de Salud (Bridges to Health), a largely volunteer-run organization that strives to meet the health needs of the growing Latino population in South Philadelphia by providing medical care and focusing on the social determinants of health. The summer literacy component focuses on a bilingual approach to literacy, exploring aspects of both Latino and American culture to engage students in reading and writing. / / **Objectives:** The objective of Puentes Hacia el Futuro was to address the “summer slide phenomenon”; the decline in students’ literacy levels that occurs during the summer break from school when many students lose touch with the skills they’ve learned over the past year and begin the new school year behind. The summer slide phenomenon is much greater in low income families, and addressing the slide in students with these backgrounds may go a long way in closing the achievement gap between low and high-resource students. / / **Methods:** Over the course of six weeks, we worked with a team of tutors to engage our campers in bilingual books about food, art, nature, immigration, sports, and superheroes. Each week’s theme incorporated a variety of reading and writing exercises including read-alouds, charades, free verse poetry writing, and journaling to expose students to diverse approaches to literature. In addition, weekly field trips, including a trip to Jose Garces Luna Farm during our nutrition unit and an afternoon in an art studio during our art unit, helped to get our campers excited about developing their person artistic and literal expression. As a dental student, I also had the pleasure of incorporating an oral health component by holding an oral health workshop for the students and their parents. / / **Outcomes:** By the end of the six week summer program, our students learned about the components of a healthy diet and proper daily oral hygiene habits including brushing, flossing, rinsing, and cavity-inducing foods. In addition, through activities that helped them to put themselves in the shoes of various historical hero figures in Latino culture, they were able to discuss with each other the types of people they wanted to grow up to be and how to make the right decisions in difficult situations. One of our high school students cultivated her talent for fictional short story writing, while another third grader discovered his innate talent for poetry and love of mystery novels. It is our hope that participating in Puentes Hacia el Futuro provided a spark of interest in reading and writing for our students that they will continue to build throughout their educations.
Student(s): Jasmine Mohandesi
Corey Toscano

Title: Ready, Wiling, & Able

Academic Preceptor(s): Joan Gluch RDH, PhD University of Pennsylvania, School of Dental Medicine

Community Preceptor(s): Mark Atwood, Manager of Communications and Development, Ready, Willing & Able

Community Site: Ready Willing & Able

Program Description: RWA is a center for the homeless. To successfully complete the year-long program, members must accomplish 3 goals: The client must find a stable job and make a consistent income; that client must have the keys to their own place; and that client must become addiction free, whether drugs or alcohol. During their time at RWA, the men are provided with the tools and training, whether educational or occupational, to accomplish these goals. / Objectives: Plan nutritious meals for the members, culminating in a final Heart Healthy dinner accompanying a healthy eating presentation; conduct educational talks during weekly Relapse Prevention meetings on topics like: Oral Hygiene, Heart Health and Smoking Cessation; provide office hours to help the trainees schedule dental/health appointments and to answer health insurance questions; and health Initiative program for the center to be used in coming years. / Methods: Implemented healthier cooking in the kitchen through food substitutions, a Heart Healthy dinner, and developed a plan to place nutrient facts on commonly prepared foods in the kitchen. We also conducted research on health topics and prepared weekly short presentations, which included powerpoint, in-depth pamphlets, and other resources. We contacted the Mutter museum to schedule a time/date for the “Men in Blue” to enjoy the museum. We also researched low-cost dental and health-care facilities, and provided clients with a time to come in and schedule needed appointments. In addition, we researched and revised the Medical Resources Manual and created a Quick Sheet of the information provided in the manual which would be more user friendly. Finally, we identified major areas of need pertaining to a Health Initiative and then researched ways to address those needs. / Outcomes: Ready, Willing & Able really changed our perspective on homelessness and the challenges faced by the homeless community. Our hope is that the health education lessons that we were able to share with our clients, along with some of the infrastructure we helped to develop, will continue to be impactful long after the completion of our internship.
**Student(s):** Jonathan Shue

**Title:** Bridging the Gaps at Covenant House Pennsylvania

**Academic Preceptor(s):** Joan Gluch, Penn Dental,

**Community Preceptor(s):** Denise Johnson, Covenant House Pennsylvania,

**Community Site:** Covenant House Pennsylvania

A multi-disciplinary team worked to enact change and promote healthy habits at Covenant House Pennsylvania. A medical student, a public health student, and a dental student worked together to engage the Covenant House youth in a myriad of self-betterment activities. Classes on oral health, general hygiene, smoking and obesity, cardiovascular health, nutrition, interview fundamentals, and career pathways were commonplace. These classes were coupled with resume writing workshops and less formal stress management and team building exercises to foster an atmosphere of goodwill and professional development. The objective of the Covenant House Pennsylvania project was to assist the youth along their vocational endeavors, to instill a new sense of hope in their lives and, of course, to promote healthy habits. Ultimately, many of the youth successfully applied for jobs and made the transition into the workforce; a number of them may have garnered a few health recommendations that they will put into practice along their way to long and prosperous lives. The “Bridging the Gaps” members left the project with a much greater appreciation for the complementary roles of professionals in an interdisciplinary setting, for the importance of establishing and maintaining professional boundaries, and for the hardships faced by displaced youth in urban environments.
Student(s): Winnie Lam

Title: A Two-Fold Summer: Breast Cancer Awareness and Childhood Nutrition

Academic Preceptor(s): Joan I. Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine; Ann L. O’Sullivan, PhD, FAAN, CRNP, University of Pennsylvania, School of Nursing

Community Preceptor(s): Shaina Mitchell, MPH, CHES, Bebashi-Transition to Hope; Heidi Sykora, Bebashi-Transition to Hope

Community Site: Bebashi - Transition to Hope

Program Description: The student were involved with two different programs during their time at Bebashi. Bebashi is one of the sites for Philadelphia’s Summer Food Program. The program serves children from low-income families that normally eat free or reduced-price meals during the school year. During the summer when children are not in school, they are more at risk for hunger and malnutrition, so the food program attempts to provide hunger relief. Bebashi’s Breast Fest is an annual event, educating mainly African American women on breast health, while offering food, gifts, clinical breast exams, and mammograms all for free. //Objective: Objective for the summer food program were: incorporating an educational component into the lunch program, outreach to the children in the community to attend with a goal of 30 attendees each day, and maintaining the food program under the government’s stipulations. / Objective for Breast Fest were: outreach to spread awareness of the event with at least 200 attendees (20 signed up for mammograms) and event planning for the event. / Methods: Summer Food program: went door-to-door with fliers (targeting families), reduced numbers of lunches, created a “share box” to decrease wasted food, and 15 minutes enrichment lessons (on oral health, heart health, and nutrition) / Breast Fest: called organizations and centers to recruit people to come to the event, used cold-calling over the phone, handed out fliers to surrounding area. / Outcomes: The summer food program had had over average 10-15 children attending with the children very engaged with hands-on-activities. However, there were issues with motivating families to come. We need to figure out how to get the parents/guardians to be more engaged with the community and participating in the summer food program. / Breast Fest: 175 RSVP, 112 attended the event. Need to establish a future reference list, since it’s difficult to know what organizations would be interested in attending and create a list of sponsors. More women were interested in the mammograms than offered, so we need to find a way to expand the service in order to fit the needs of the population.
Student(s): Bianca Dubose-William

Title: Promoting Healthy Habits in the Therapeutic Nursery

Academic Preceptor(s): Joan I. Gluch, PhD, RDH; Ann L O’Sullivan, PhD,FAAN, CRNP

Community Preceptor(s): Janet Caputo

Community Site: Children's Crisis Treatment Center

Program Description: The Children’s Crisis Treatment Center Therapeutic Nursery (CCTC, TN) is a structured full-day preschool treatment program for children aged 2½ to 5. The Center provides emotional and behavioral health services, including psychiatric services, group therapy and educational activities. / /Program Objectives: Work on complimenting, praising and providing positive responses to the children; Develop games/activities focused on different aspects of: Oral Hygiene, Fitness, Nutrition, Doctor’s visits; Evaluate focus on nutrition: assess nutrition education, determine nutritional habits of children at the TN/at home (if possible) / /Methods: Behavioral: worked with the staff to implement the methods of positive encouragement and behavioral support that they advocate in the TN / Oral Hygiene: Discussed oral hygiene habits; Demonstrated how to properly brush teeth with puppet and toothbrush; Taught about germs, cavities, and visiting the dentist; Plaque-disclosing tablet demo performed by teachers; Gave out oral hygiene supplies / Hygiene: Reinforced washing hands before and after meals; Taught about covering your mouth when coughing or sneezing / Cardiovascular Health: Healthy Heart poster: kids’ drawings of what keeps their hearts healthy; Encouraged active play during outdoor time: water play, bike riding, active games / Nutrition: Assisted w/ previously implemented nutrition education; Played game distinguishing between good and bad foods / /Outcomes: This summer in the TN provided us with an informative glimpse into the world of behavioral health. From both the staff and the students, we gained a better understanding of how to support and nurture children with behavioral challenges and were able to carry out our objective of learning how to positively assist and encourage the children at CCTC. Based on the above mentioned activities that we implemented, we were able to supplement the children's oral hygiene, general hygiene, cardiovascular health/exercise and nutrition understanding and education. We believe that we made the greatest strides in helping to develop their understanding of oral hygiene and cardiovascular health. This internship will positively shape our respective educational paths because we intend to work in pediatric nursing and dentistry. As health professionals, we hope to continue to bridge the gaps between ourselves and children within the Philadelphia community.
Student(s): Daniel Bui

Title: Patterson Summer Camp: Where a Kid Can Be a Kid

Academic Preceptor(s): Joan I. Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine; Ann L. O’Sullivan, PhD, FAAN, CRNP, University of Pennsylvania, School of Nursing

Community Preceptor(s): Lorraine Thomas, Southwest Community Development Corporation,

Community Site: Patterson School

Program Description: The Patterson School, in conjunction with the Southwest Community Development Corporation, organizes a free camp during the summer for kids in Southwest Philadelphia. The Patterson Summer Camp provides free educational and recreational activities, and nutritious breakfast and lunches for the campers during the seven-week program. / /Objectives: The goal during this camp was to create fun lesson plans for all the children in the camp to participate in and to learn from. Since there were groups of children of different ages, our ultimate task was to tailor our lesson plans in a way that was suitable for each age group while maintaining the educational and entertainment factor. / /Methods: We did this by incorporating topics like health and nutrition into outdoor exercises, or even taking the kids to museums to learn about science. There were also times when we involved people from the local community to speak with the children, including police officers from the Philadelphia Police department. We tried to minimize the amount of time the children were inactive and maximize the amount of time they were interactive. / /Outcomes: By integrating important learning topics with enjoyable activities, we noticed the children were more receptive and more eager to learn. These kids were very happy with our lessons, and that served as motivation for us to come up with more innovative teaching methods. In the end, this led to a successful summer camp.
Student(s): Amber Yanyao Fu

Title: Just Being Kids

Academic Preceptor(s): Joan I. Gluch, PhD, RDH, PHDHP, University of Pennsylvania, School of Dental Medicine; Maria Hervada-Page, MSS, Thomas Jefferson University, Jefferson Medical College

Community Preceptor(s): Christine Haynes, BSN, RN, Director of Nursing, Frankie’s World

Community Site: Frankie's World

Program Description: Frankie's World is a non-profit medical day care for children with special healthcare needs. / / Objectives: To assist the teachers and nursing staff in daily tasks, promote healthy habits, and broaden our understanding of medically complex patients and their families / / Methods: We developed age appropriate activities to promote hand-washing, brushing and flossing, and healthy foods. / / Outcomes: We saw firsthand the benefits of interdisciplinary care between healthcare professionals. We also learned that assumptions should not be made about patients young or old. Regardless of their individual medical issues, these kids just wanted to play and learn like regular kids-- Frankie's World provides a wonderful opportunity for them to do so safely.
Student(s): Tranchau Hoang

Title: Qualifying Undocumented Children for Public Health Insurance

Academic Preceptor(s): Joan Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine

Community Preceptor(s): Colleen McCauley, RN, BSN, MPH, Director of Health Policy, PCCY

Community Site: Public Citizens for Children and Youth (PCCY)

The BTG student intern worked on launching an initiative at PCCY to qualify undocumented children for public health insurance. To achieve this long-term goal, the intern engaged in the preliminary policy efforts to amend state law to provide public health insurance for ALL children in Pennsylvania. While changing the law is a multifaceted endeavor, the first step was to engage with individuals affected by this health policy gap. PCCY and the student intern met with families of undocumented children to discuss their real-world experiences with a healthcare system that currently excludes their children from receiving covered care. To mobilize the mission, the student intern built coalitions by establishing partnerships with organizations throughout the local and regional communities. The intern scheduled and conducted interviews with non-English speaking families, with the collaboration of local interpreters. They gathered this information to develop a future data report to inform state legislators about the current gaps in access to health insurance for children. The interns’ work on this project was part of the initial momentum behind a larger movement.
Student(s): Suvidha Polu

Title: Healthy Habits, Happy Baby!

Academic Preceptor(s): Joan I. Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine

Community Preceptor(s): Kisha Gadsden, Maternity Care Coalition, Cribs for Kids Program Manager

Community Site: Maternity Care Coalition - Cribs for Kids

Program Description: Cribs for Kids, a component program of the Maternity Care Coalition, provides needy families in Philadelphia with cribs and education on safe sleeping environments. Cribs for Kids also provides education on how to reduce the risk of sudden infant death syndrome (SIDS). The organization hosts workshops throughout the city and home visits for those who cannot attend the workshops. Cribs for Kids also increases awareness about safe sleeping habits and their program by attending community health fairs. In the last year Cribs for Kids has provided families in the city of Philadelphia with over 2,000 safe sleeping environments.

Objectives: 1. Increase Mothers’ awareness of infant oral health 2. Incorporate cardiovascular education for new mothers 3. Reinforce safe sleeping education for clients

Methods: Majority of education was provided though workshops and home visits. Workshops were held at different locations in the city and were the most efficient means of providing education to new and expecting mothers. Home visits involved one on one interactions with the new mother and were more personalized. Oral Health education was given orally during the safe sleep presentation and mothers were sent home with infant toothbrushes and pamphlets. Cardiovascular health education was a new addition to the safe sleep curriculum and was included in the take home materials for mothers.

Outcomes: An increased awareness of the importance of infant oral health and postnatal cardiovascular health for new mothers in Philadelphia.
Student(s): Brittany Gragg

Title: Promoting Positive Oral Health Habits

Academic Preceptor(s): Joan Gluch PhD, RDH  University of Pennsylvania School of Dental Medicine; Zvi Gellis PhD, University of Pennsylvania, School of Social Policy and Practice

Community Preceptor(s): Kiasha Huling, LSW; Dr. Bernett L Johnson Jr.Sayre Health Center

Community Site: Sayre Health Center

Program Description: Opened in 2008, Sayre Health Center is a non-profit health center that provides dental and medical care to the underserved West Philadelphia Community. Additionally, due to its location, the center provides health services education to Sayre High School Students.  

Objectives: Goals of the project included the desire to spread oral health care knowledge to children and parents in community surrounding Sayre, and to increase awareness about the dental care offered by Sayre Health Center.  

Methods: After assessing the need for oral health education in the community, interns developed an oral health activity book and curriculum to be implemented at local daycares and summer camps. The curriculum included a dental storybook, brushing activity and snack activity. The children were then given an oral health activity book, take-home package of oral hygiene products and parent information brochures.  

Outcomes: Outcomes of the project included the delivery of coloring books and oral health materials to over 240 children and teens at 10 different summer camp and daycare locations. The scope of the outreach will continue to be evaluated as evidenced by increased dental patients visiting Sayre.
**Student(s):** Zachariah Cole

**Title:** School Readiness

**Academic Preceptor(s):**
Joan I. Gluch, RDH, PhD, University of Pennsylvania, School of Dental Medicine
Ann L. O’Sullivan, PhD, FAAN, CRNP, University of Pennsylvania, School of Nursing

**Community Preceptor(s):**
Lisa Abdul-Haqq, RN, BSN, MA, Health Federation of Philadelphia, Early Head Start Program
Denise McConney, MAT, Health Federation of Philadelphia, Early Head Start Program
Khadijah Muhammed, MSEd, MSW, Health Federation of Philadelphia, Early Head Start Program

**Community Site:** Health Federation of Philadelphia Early Head Start

**Program Description:** The BTG interns at Health Federation Early Head Start helped the staff provide comprehensive, home-based services to 177 low-income infants and toddlers, pregnant women, and their families. They also helped to promote healthy prenatal outcomes for prenatal women, enhance development of very young children, and promote healthy family functioning.

**Methods:** In order to accomplish these goals, the interns participated in recruitment activities at the Riverfront Correctional Facility for Women and the Earn Center. They also helped with health screenings, which included dental and hearing, at socializations, which were groups led by the staff to promote nutrition, literacy activities, and parenting to the families. The interns also accompanied some child family advocates on home visits where they taught about personal oral hygiene, prenatal health, and healthy child development. In addition, the interns set up prenatal workshops so pregnant women could learn about maternal and infant oral health and nutrition.

**Outcomes:** For the final project, the interns decided that school readiness should be one of the main focuses for that summer. They wanted children to have the skills, knowledge, and attitudes necessary for success in school and for later learning and life. Since children learn through play and exploration, they decided to incorporate early childhood education domains by allowing the children to use their five senses to experience the world through play in an event called a Sensory Celebration. Each activity encouraged the children and parents to use effective communication and listening skills. Some of the activities included Simon Says, a mini obstacle course, edible play, water play, and scented sand. Over 30 children and their parents participated in the event.
Student(s): Abby Yavorek

Title: From Tots to Flower Pots: Summer Camp at Francis Myers

Academic Preceptor(s):
Zvi D. Gellis, PhD, University of Pennsylvania, School of Social Policy and Practice
Joan I. Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine
Maria Hervada-Page, MSS, Thomas Jefferson University, Jefferson Medical College
Loren Robinson, MD, University of Pennsylvania, Perelman School of Medicine

Community Preceptor(s):
Edna Reddick, Francis J. Myers Recreation Center

Community Site: Francis J. Myers Recreation Center

Program Description: The Bridging the Gaps interdisciplinary team at Francis Myers Recreation Center, consisting of 4 graduate students of different backgrounds, collaborated with community members to develop a health curriculum for the center’s youth summer camp. The interns implemented health and wellness activities to promote healthy lifestyles and habits within the campers. Each morning the team designed fitness stations to encourage cardiovascular health, and each afternoon classroom activities were planned to further advance the children’s understanding of nutrition, wellness, and safety. From the combined efforts of the center’s community leaders and interns, the camp became a place for local kids to have a fun and unforgettable summer. //Objectives: The Bridging the Gaps interns strived to expand the knowledge, enthusiasm, and physical activity levels of their 3 to 5 year old campers over a ten week period. Specifically, they focused on three areas: physical activity and cardiovascular strength, nutrition (with special emphasis on dental health), and physical and emotional safety and well being. //Methods: Interns spent 6 hours, 4 days a week over the 10-week period. Mornings we’re spent focusing on engaging, outdoor exercises, where campers were encouraged to stay active while having fun. After a nutritious lunch, each afternoon was dedicated to interactive lesson plans. These included science demonstrations about matter and statistic electricity, dental hygiene instruction, stranger danger performances, and nutrition taste tests. At the end of the program, the interns had a discussion with the campers about what they had retained from the activities this summer. //Outcomes: The 3-to-5 year old campers were both receptive and responsive to the lessons implemented by their Bridging the Gaps mentors. They left their summer program with a better understanding of cardiovascular health, nutrition, safety, and oral hygiene. The interns, conversely, expanded their knowledge of other health fields as they worked together in an interdisciplinary team in order to create daily lesson plans, and developed creative thinking skills in order to permeate the minds of their pupils.
Vernon Brightman
Summer Research
Abstracts
Student: Souren Hajjar

Faculty Preceptor: Dr. Anh D. Le

Title: Cisplatin Induced EMT and Glycolysis Render SCC-1 Cells Resistant to Chemotherapy

Objective: Cisplatin induces an epithelial to mesenchymal transition and altered glycolysis to render SCC-1 cells resistant to chemotherapy. / / Introduction: Squamous cell carcinoma of the head and neck has an incidence of 500,000 new cases per year globally and is the most frequent malignant tumor of the head and neck. Despite substantial improvements in treatment of head and neck squamous cell carcinoma (HNSCC), the prognosis of this malignancy is still poor with the 5-year survival rate not changed for decades. The poor survival can partly be attributed to the high frequency of locoregional recurrence (30-40% after standard treatment) and distant metastases (20-30% after standard treatment). Recurrent tumors are often therapy-resistant and may have their origin in resistant cancer stem cells (CSCs) or in tumor cells with an epithelial-mesenchymal transition (EMT) phenotype. Cisplatin, an alkylating-like agent causing DNA crosslinking, therapy is widely used to treat squamous cell carcinoma. This project is exploring EMT and glycolytic changes as a potential pathway for Cisplatin drug resistance in head and neck squamous carcinoma. / / Methods: SCC-1 cells (human tongue cancer cell line) were cultured in RPMI 1640 to a confluency of 60-80% and seeded in 6 well plates. Cells were treated with Cisplatin at increasing concentrations (0 to 100 ng/ml) for 48 hours. MTT assay was carried out to determine the effect of Cisplatin on cell proliferation. Western blot, immunocytostaining, and lactate analysis were conducted to evaluate the expression of EMT markers and metabolic changes. / Results: Cisplatin-treated SCC-1 cells displayed a classical EMT spindle shape morphology, which correlated with significant changes in EMT markers, specifically a decrease in E-cadherin, an increase in Vimentin, and Snail expression as shown by western blot and immunocytostaining analysis. The EMT was also marked by an increase in lactate production (increase in glycolysis) and PDK1 expression. The increase in EMT markers and glycolytic activity in SCC-1 cells induced by Cisplatin is a similar phenomenon observed in head and neck cancer cells treated with EGF. / / Conclusion: Although Cisplatin is toxic to head and neck squamous cell carcinoma cells, it can induce EMT in a small population of cells. The cells that undergo the EMT show characteristic signs like cell morphology changes, increased mesenchymal target proteins, and decreased epithelial target proteins. A glycolytic heavy metabolism, producing higher rates of lactate, was also observed in the in cells undergoing EMT from Cisplatin treatment. These results hope to unravel the mechanism and consequences of EMT with particular interest to squamous carcinoma recurrence and metastasis. Future studies will need to be conducted to explore the cellular mechanisms involved in Cisplatin-mediated EMT and glucose metabolic reprogramming in HNSCC cells.
Student: Philip Chang

Faculty Preceptor: Dr. Yan Yuan and Dr. Hui Chen

Title: KSHV RTA Degrades Anti-Viral TRIM Family Proteins

Kaposi’s Sarcoma Associated Herpesvirus (KSHV), induces the abnormal growth of Kaposi’s Sarcoma (KS) cancer cells. KSHV is the most common malignancy in AIDS patients and is strongly associated with oral health. The oral region makes up for approximately 30% of KSHV cases. KSHV latent infection allows the viral DNA to integrate into the host cell’s genome and undergo cell proliferation and also inhibit apoptosis. However, KSHV lytic infection leads to the inflammation and growth of KS lesions which will ultimately result in cell death and production of more viruses. Previous research found a protein called Replication and Transcription Activator (RTA), which is responsible for the switch between KSHV latent and lytic infection. RTA expression is enough to disrupt KSHV latency and activate the lytic cycle. Research has also found RTA may have other functions such as protein degradation. It is also possible RTA can function as a E3 ubiquitin ligase and degrade itself through the ubiquitin-proteasome pathway. / Tripartite motif (TRIM) are proteins that have many cellular functions. One TRIM function that has been studied is the response against viral infections. TRIM controls and restricts viral reproduction by targeting viral proteins which sends signals for innate immunity responses and cytokine activation. Like RTA, TRIM also has a protein degradation function. TRIM helps to degrade viral protein through ubiquitin-proteasome pathway. Many of the viral mechanisms of KSHV has been unknown and speculated for several years. As mentioned, RTA is the regulator of KSHV infections and TRIM responds to viral activity. Therefore, defining the functions of RTA and TRIM in KSHV infected cells will help to further understand mechanisms of KSHV. TRIM inhibits KSHV infection and therefore responds to virus infections. To explore TRIM functions in KSHV infections, 293T cells were transfected with five different TRIMs and followed by KSHV infected plasmids (BAC16). Results showed TRIM has decreased the amount of KSHV viral proteins in the plasmid. Therefore, TRIM can function to inhibit KSHV infection. Moreover, RTA degrades TRIM. RTA promotes the degradation of several proteins. To investigate whether RTA will degrade TRIM proteins, RTA was co-expressed with each TRIM proteins into 293T cells. Western blot analysis showed that all five TRIM proteins were absent when co-expressed with RTA. Therefore, RTA expression degrades TRIM. In addition, E3 ligase activity of RTA contributes to the degradation of TRIM proteins. To investigate whether RTA functions as an E3 ligase promoting the degradation of TRIMs, RTA mutants and each TRIM proteins were co-expressed in 293T cells. / In our research, we demonstrated TRIMs inhibits KSHV infection, and that RTA ultimately degrades TRIMs by the E3 ligase activity of RTA. From our findings, we wonder why and how RTA degrades TRIMs. Further investigation is needed in order to understand RTA and TRIM proteins functions in KSHV.
Student: Kristine Fu

Faculty Preceptor: Hydar Ali

Title: Role of GRK on FcεRI Signaling in Mast Cells

Objective: The purpose of this study was to examine the role of GRKs expressed in mast cells to see whether GRK2 acts alone in regulating the FcεRI pathway, or if other GRKs (GRK5 or GRK6) work in concert with GRK2. 

Introduction: Mast cells are important regulators of innate immunity, and play a central role in allergic diseases. The aggregation of high affinity IgE receptor (FcεRI) by antigen leads to degranulation and rapid release of inflammatory mediators like histamine. This is followed by a delayed response resulting in the generation and release of chemokines and cytokines. Phosphorylation of G protein-coupled receptors (GPCRs) by GPCRkinases (GRKs) promotes their desensitization and internalization. G-protein coupled receptor kinase 2 (GRK2) was found to regulate antigen-induced responses in mast cells. By silencing GRK2 expression, mast cells showed about a 50% decrease in Ca2+ mobilization and degranulation, but resulted in nearly abolishing cytokine release as measured by IL-13 and IL-6 generation. Overexpression of GRK2 or its RH domain enhanced antigen-induced mast cell degranulation and cytokine generation. 

Methods: Mice with knockout GRK5 and mice with knockout GRK6 were obtained. The following tests were performed on the mast cells with silenced GRK5 expression and the cells with silenced GRK6 expression: (1) Western blot for GRK4-6 antibody, (2) Toluidine blue stain to examine the tissue distribution of mast cells and to count the cells, (3) FcεRI expression by flow cytometry, (4) Calcium mobilization, (5) Degranulation as measured by β-hexosaminidase release, and (6) cytokine production as measured by IL-6 and IL-13 using ELISA. The first three tests were to confirm that the mast cells from the knockout mice were indeed knockout mice for GRK5 and GRK6 respectively, and to ensure their tissue distribution and FcεRI expression were similar to wild type mast cells. The last three tests were to determine the effects of silencing GRK5 and GRK6 respectively on mast cell function through the antigen-induced FcεRI pathway.

Results: Western blot confirmed the absence of GRK5 in the GRK5 KO mice, and also confirmed the absence of GRK6 expression in the GRK6 KO mice. Tissue distribution mast cell counts and FcεRI expression confirmed that the mast cells from the knockout mice were similar to wild type mast cells. In the GRK5 KO mast cells and in the GRK6 KO mast cells, calcium mobilization studies, degranulation, and cytokine release were identical to the wild type mast cells. 

Conclusion: We conclude that GRK2 acts alone in regulating the FcεRI pathway in mast cells, without the aid of GRK5 or GRK6.
Student: Raymond Duong

Faculty Preceptor: Dr. Elisabeth R. Barton

Title: Non-Glycosylated Pro-IGF-1 Reactivity: Understanding its role in disuse atrophy

Introduction: Insulin-like-growth factor I (IGF – 1), also known as somatomedin C, is a protein that can act as a hormone, initiating and facilitating numerous biological activities such as muscle regeneration. More so the last decade, the different isoforms IGF-1 has been a growing interest for investigators. / / Objective: Knowing how IGF-1 plays an essential role in muscle physiology, this study assesses the efficacy of a Pro-IGF-1 isoform and its relevance to disuse atrophy. More specifically, we observed the competence of the non-glycosylated pro-IGF-1 and the role that N-glycosylation plays on the E-peptide extension. Our hypothesis is that non-glycosylated pro-IGF-1 is more efficient than its glycosylated form in regards to efficacy in muscle recovery during the process of reloading after disuse atrophy had taken place. / / Methods: Mice specimens were utilized and injected with virus expression non-glycosylated pro-IGF-1 into targeted muscle groups in their hind limbs (one limb for experimental and the other for control). The hind-limb suspension model were applied to induce muscle atrophy on these mice and suspended for 7 days prior to reload at different time points (3, 7, 14 days). One group was left suspended throughout the experimental process. The specimens were sacrificed at the indicated time points where targeted skeletal muscle groups were extracted for morphological, biochemical, and functional analysis. Each tissue was blotted, weighed, and flash frozen (with liquid nitrogen) prior to analyzes. Immunohistochemistry was used to determine fiber areas. ELISA was used for evaluations to test for IGF-1 protein content levels. Functional analyzes will be obtained with the coordination of the technicians in the Anatomy and Cell Biology Department. / / Results: With the limited time frame, it was found that the day 7 showed approximately a 10% increase in function in the limb injected with non-glycosylated pro-IGF-1. Due to unforeseen deaths of the mice specimens, the data collected from the other time points could not be used to further support this finding. / / Conclusion: Preliminary data shows mildly beneficial result that supports our hypothesis. However, additional analysis and duplication of the experiment is needed to determine the role glycosylation plays in muscle recovery.
**Student:** Shalini Patel  

**Faculty Preceptor:** Dr. Claire Mitchell  

**Title:** Interactions Between Mechanical Stretch and Local Inflammatory Messengers in Glaucoma  

**Introduction:** Glaucoma is a multifactorial disease, with the most important factor being an increase in intraocular pressure (IOP). This increased pressure leads to damage to the optic nerve. A mechanical strain such as an increase in IOP can lead to the release of ATP. Previous data shows that human patients with glaucoma had an elevated level of ATP in their aqueous humor. ATP released through pannexin channels in the eye can autostimulate the P2X7 receptor in these cells. Autostimulation of the P2X7R enhances expression of cytokines like IL-1B and IL-6, which are important mediators of inflammatory response. The specific pathway that we focused on was the activation of inflammasome NLRP3, which cleaves pro-caspase1 into active caspase1, which in turn cleaves pro-IL-1B into active and releasable IL-1B, which causes inflammation. This lead to the hypothesis that mechanosensitive release of ATP and autostimulation of the P2X7R represent a logical and likely pathway by which elevation of IOP leads to cytokine activation.  

**Objectives:**  
1) Confirm that extracellular ATP links IOP elevation to cytokine response in vivo using acute rodent glaucoma models. 2) Confirm preliminary data to provide the possible use of drugs to target the P2X7R. Brilliant Blue G (BBG) is a P2X7R antagonist and a decreased cytokine response in those rats with blocked P2X7Rs will identify BBG as being a possible pharmacological target in treating glaucoma.  

**Methods:** PCR cycles were run on multiple rat and mice samples to measure the relative gene expression of IL-1B and NLRP3. These rats and mice were subject to the CEI model, which stands for Controlled Elevation of Intraocular pressure. The CEI model enables the temporal relationships between IOP, purines and cytokines to be determined and the contribution of the pannexin and P2X7 genes to be confirmed in knockout mice. By measuring the gene expression we determined if there was an increase in cytokine response in those samples subject to an increase in intraocular pressure. We also compared responses in those CEI rodent models injected with BBG versus those samples injected with saline to see if there was a decreased cytokine response in those samples with blocked P2X7Rs.  

**Results:**  
1) Cytokine IL-1B expression was higher in those rats exposed to an increase in intraocular pressure 2) IL-1B expression in both groups of rats subject to IOP increased but the group of rats injected with saline expressed a higher level of IL-1B than the group that was injected with BBG, a P2X7 receptor antagonist 3) Lastly, IL-1B and NLRP3 gene expression increased in both young and old mice models subject to an increase in IOP.  

**Conclusions:** Inflammatory gene expressions of IL-1B and NLRP3 were elevated in both rat and mice CEI models. Furthermore, gene expression in those rats injected with BBG were lower than those injected with saline, providing us with further evidence to identify BBG as being a possible pharmacological target.
Objectives: (1) To investigate the effects of Exothane 10 and 108 on the hardness and stability in ethanol of 80/20 weight (wt) % Bis-GMA and TEGDMA based composites and (2) to assess the optimal wt % of Exothane 10 and 108 that provide the highest increase in the hardness of the composites. / /Introduction: One of the most commonly performed procedures in dentistry is removal of dental decay and restoration of the prepared tooth space using dental filling materials. Because teeth are exposed to harsh mechanical stresses from mastication of food, mechanical properties, such as the hardness and toughness, are critical factors to consider for the development of the filling material. The dental filling material commonly used today are composites comprised of bisphenol A-glycidyl methacrylate (Bis-GMA) and triethylene glycol dimethacrylate (TEGDMA). Unfortunately, these materials are prone to cracks and fractures, making replacement of the filling material inevitable (Chen et al. 2012). Recent investigations suggested that the material properties of this material can be enhanced by incorporating liquid rubber (Kerby et al. 2003, Mante et al. 2010). However, it is unknown how integrating elastomers (Exothane 10 and 108) affects the resulting properties of the dental composites. / /Methods: Exothane 10 and Exothane 108 were added in 10% increments up to 50% to a mixture of Bis-GMA (80 wt%) and TEGDMA (20 wt%) containing 1 wt% N,N-dimethylaminoethyl methacrylate and 0.5 wt% Camphoroquinone and 20% silane coated inorganic filler. The composite mixture was cured to fabricate disc-shaped specimen, and the cured samples were stored at 37 °C for 24 hours for complete polymerization. Barcol Hardness (BH) of the disc samples was tested by making three hardness indentations on sample surfaces using Barcol Indentor Model GYZ. In addition, the degradation rate of the Exothane specimen was measured by immersing the disc samples in ethanol for 24 hours in the incubator. Then, BH testing of the samples was performed after 6, 12, 18, and 24 hours of immersion. BH values were compared via one-way ANOVA with Newman-Keul’s post hoc analysis. Significance was set to p<0.05. / /Results: Composite samples with 40 wt% Exothane 10 had significantly lower Barcol Hardness (BH) values while 10 wt% Exothane 10 had significantly higher BH values than the control. Samples with 20 and greater wt% Exothane 108 had significantly lower BH values than the control, whereas there was no difference between the BH values of 10 wt% Exothane 108 and the control. Degradation rate of 10 wt% Exothane 10 samples was the slowest. However, samples with 20 and greater wt% Exothane 10 degraded faster than the control. Samples with 10 wt% Exothane 108 degraded at a similar rate to the control. / /Conclusions: This study revealed that incorporating 10 wt % of Exothane 10 enhanced the BH values as well as the stability in ethanol of the composite compared to the control.
**Student:** Minje Kim

**Faculty Preceptor:** Dana Graves

**Title:** Role of AGE and IL-17 in the Expression of Bone Matrix Proteins in Osteoblast Lineage Cells

**Objectives:** The objective of this research is to study the mechanism by which AGE and IL-17 induce decreased bone mineralization using MC3T3, mouse pre-osteoblastic cell line.

**Introduction:** Periodontal bone loss results from the failure of coupling between bone formation and resorption. Intercellular communication between osteoblasts and osteoclasts via the RANK-RANKL signaling pathway is key to bone homeostasis. Bone sialoprotein (Bsp) is a non-collagenous bone matrix glycoprotein abundantly expressed by osteoblasts. Studies suggest that lowered levels of Bsp negatively regulate osteoblast differentiation, resulting in decreased mineralization of osseous tissues. Diabetes results in deregulation of bone coupling, and diabetic conditions result in increased formation of advanced glycation end products (AGEs). Nuclear Factor kappa-B (NF-kB) represses bone matrix proteins and impairs bone coupling. IL-17 also influences osteoclast differentiation via NF-KB ligand RANKL expression.

**Methods:** MC3T3 cells were cultured in 10% FBS (fetal bovine serum) until 90% confluence was reached. Cells were transferred to media supplemented with 0.4% FBS. They were stimulated with two different concentrations of AGE at different time points to mimic diabetic conditions. Cells were then treated with Bsp in order to see if there was any impairment in the bone formation process. The expression of Bsp was analyzed using immunofluorescence (IF) staining. Mean fluorescence intensity (MFI) was collected to quantify the given results. Cells were grown in media supplemented with IL-17 and BMP2. First, dose and time dependent experiments were carried out: 10ng/ml, 33ng/ml, and 100ng/ml at 24 and 48 hours. Bsp protein expression was determined using IF staining. Inhibitors for the following signaling cascades have been used to measure the extent of rescue of the impaired bone coupling: NF-kB, Akt, ROS, SIRT, HDAC, FOXO1, GSK, Wnt and p38.

**Results:** For those stimulated with 100μg/ml of AGE, there was an apparent decrease in the level of Bsp expression for 24 and 48 hour time points. However, for the group treated with 500μg/ml, there was no significant decrease observed. It was difficult to draw conclusions due to this inconsistency in the data collected. BSP expression upon 100ng/ml of IL-17 stimulation (48 hour) was used to measure the extent of rescue by the inhibitors. Bsp immunofluorescence confirmed the effectiveness of most inhibitors upon IL-17 stimulations. NF-kBi showed 85.5% rescue, whereas AKTi and ROSi completely prevented the function of IL-17 via 100% rescue.

**Conclusion:** Effective bone coupling is compromised under diabetic conditions leading to bone loss. AGE at 100μg/ml concentration negatively regulated the expression of Bsp, impairing the bone formation process. Although blocking NF-KB did not result in the greatest decrease in bone loss, blocking other pathways involved in the NF-KB cascade such as ROS and AKT has shown to result in complete rescue.
**Student**: Kyung Jin Lee  
**Student Mentor**: Kang I. Ko  
**Faculty Preceptor**: Dana T. Graves  

**Title**: Investigating molecular mechanism in TNFα-induced inhibition on mesenchymal stem cell proliferation  

**Rationale**: Mesenchymal stem cells (MSCs) are multipotent stromal cells that can differentiate into various mesenchymal phenotypes such as osteoblasts, chondrocytes, and adipocytes. TNFα decreases proliferation of MSCs in inflammatory diseases such as diabetes. Here, we examined the molecular mechanism by which TNFα inhibits MSC proliferation by using small molecule inhibitors of three downstream pathways of TNFα: NF-κB pathway, JNK pathway and p38 pathway.  

**Methods**: C3H10T1/2 and hMSC cell lines were cultured in α-MEM supplemented with 10% fetal bovine serum (FBS) and 1% antibiotic/antimycotic. Prior to conditioning, MSCs were plated and allowed to reach 70% confluency in 48-well microplate. Cell cycles were re-set by incubating MSCs in 0.4% FES α-MEM solution. Each well treated with and without TNFα was also treated with PBS or inhibitors of three different pathways: BAY-117082 for NF-κB canonical pathway inhibitor, JNK inhibitor-1/2, and p38 inhibitor for 72 hours. After treatment, proliferation was measured by a 5’-bromo-2’-deoxyuridine (BrdU) assay kit and an immunofluorescence assay using a Ki-67 antibody. The experiment was repeated twice in triplicate. Statistical significance was determined at P<0.05 by one-way ANOVA.  

**Results**: After treating C3H10T1/2 and hMSC cell lines with TNFα, the proliferation decreased significantly by 70% by BrdU assay. Treatment with the inhibitor of NF-κB pathway (BAY-117082), inhibitor of JNK pathway (SP600125) and inhibitor of p38 pathway (SB203580) restored proliferation by 2.4-fold, 4.6-fold, and 4.4-fold, respectively. Ki-67 positive cells were measured; TNF treatment significantly reduced Ki-67 positive cells by 72%. The number of Ki-67 cells was significantly restored by NFκB-, JNK-, and p38-inhibitor by 3.0-fold, 3.7-fold, and 3.0-fold, respectively.  

**Conclusion**: Inhibitors restored the proliferation inhibited by TNFα but did not affect proliferation in cells untreated with TNF. Therefore, NF-κB pathway, JNK pathway, and p38 pathways are all involved in TNFα-induced inhibition on mesenchymal stem cell proliferation.
Student: Nicholas Kim

Faculty Preceptor: Kelly Jordan-Scuito

Title: Neuroprotection by a BACE1 inhibitor in Neurons treated with Anti-retroviral Drugs

Introduction: Human immunodeficiency virus (HIV) is a widespread virus that infects over 40 million people around the world. Although combination antiretroviral therapy (ART) has been shown to mitigate effects of the virus and increase the lifespan of HIV patients, ART has known side-effects including neuronal damage and death. One mechanism by which ART could cause neuronal damage is through upregulation beta secretase (BACE1), which cleaves the amyloid precursor protein (APP) to produce β amyloid (Aβ). The accumulation of Aβ can cause neuronal damage and cognitive impairment. Our hypothesis is that inhibitors of BACE1 can protect neurons against the damaging effects of ART. / / Methods: To determine the ability of the β-secretase (BACE1) inhibitor to protect the neurons from Ritonavir-induced neurotoxicity, neurons were treated with ARV. After the treatment, a combination of propidium iodide (PI) exclusion and Microtubule associated protein 2 (MAP2) staining was used to measure neuron viability. The propidium iodide exclusion allowed the visualization of cell death, as the PI will only be present in dead neurons. The live neurons were negative for the PI and positive for the MAP2 staining. The MAP2 stained neurons were counted from six fields from 12 consecutive coverslips and the percentage of MAP2 stained neurons were calculated. The neurons were also stained with synapsin and the synapsin intensity/MAP2 area was calculated, which indicates drug’s effects on the synapses. We compared neuronal responses to untreated controls, controls treated with dimethyl sulfoxide (DMSO) vehicle, and BACE1 inhibitor alone. / / Results: BACE1 inhibition alone and control treatments had no effect on MAP2+ cell count, synapsin intensity, nor propidium iodide uptake compared to untreated and vehicle controls. 48 hour ritonavir treatment resulted in 67% decrease in MAP2+ cell count and nearly a three-fold increase in propidium iodide uptake, but no change in synaptic integrity relative to MAP2 area in 10 days-in-vitro neuronal cultures. Pre-treatment with BSI (BACE1 inhibitor) rescued MAP2+ cell loss in ritonavir-treated neurons and decreased propidium iodide uptake. / / Conclusions: The BACE1 inhibitors can provide partially protect the neurons from Ritonavir mediated toxicity over 48 hours.
Student: Akemi Arzouman

Faculty Preceptor: Dr. Motomi Enomoto-Iwamoto

Title: Effect of BMSC niche signals for potential cell differentiation without expression of CD105

Objectives: Stem cell therapy is a promising form of treatment and rehabilitation in tissues that are lost or damaged. We looked into the molecular mechanisms of how stem cells can be harnessed for future therapy. //Introduction: Tendon stem progenitor cells (TSPCs) have been shown to exhibit characteristics of stem cells. TSPCs reside in a specialized niche with other cells, cytokines and ECM influencing their potential differentiation into tenocytes, chondrocytes, osteocytes, or adipocytes. When CD105—a coreceptor of TGFβ—is overexpressed in injured tendon progenitor stem cells (inTPCs), the phosphorylation of the major growth factor signaling pathway activating downstream gene transcription decreases. Bone marrow mesenchymal stem cells (BMSCs) have also shown to differentiate into tenogenic cells upon induction. BMSCs are more abundant and consequently have greater potential use in treatment. Thus we are looking to determine whether CD105 plays a similar role in BMSCs as in inTPCs. Therefore if we can potentially control CD105 expression we can enhance the efficacy of future cell therapy for tendon repair. //Methods: CD105- BMSCs were transduced with adenovirus encoding GFP (green fluorescent protein) or CD105. Each group was treated with recombinant mouse TGFβ1 for 30-120 minutes and then lysed in SDS sample buffer. CD105- inTPCs were transduced with adenovirus encoding CD105 or GFP at 50 MOI and then re-plated for TGFβ treatment. Phosphorylated smad 1/5 were examined using anti-phospho smad 1/5/8 rabbit antibody, anti-phospho smad 2/3 rabbit polyclonal antibody, or anti-phospho smad 2 rabbit monoclonal antibody followed by phospho smad 1/5/8 rabbit monoclonal antibody, anti-smad 1 antibody, anti-smad 2, or anti-CD105 rabbit monoclonal antibody in the NuPAGE Tris-Acetate Gel system, Xcell SureLock Mini-Cell, and Xcell II Blot Module. //Results: Immunoblots performed for CD105 infected BMSC cells demonstrated an increase integrated density of both psmad 1/5 and psmad 2. However the same immunoblots also showed that CD105 adenovirus-infected BMSCs did not show any definitive expression of CD105. //Conclusions: The initial immunoblots performed with CD105 infected BMSC cells demonstrated an increase in psmad 1/5 and psmad 2. These results show that CD105 expression is a positive regulator of the smad 1/5 and smad 2 pathways, which is different from the data that was previously collected. Thus to verify these unique results, immunoblots for CD105 were performed and indicated that the CD105 adenovirus-infected BMSCs did not show any definitive expression of CD105. We hypothesize that the viral titer for the BMSC lines is different than the optimum titer used for inTPCs. In further investigation we would look to find the optimum titer for virus infection for the BMSC cell lines to accurately assess the effect of CD105 on BMSCs.
**Student:** Ivana Araba-Yahan Derby  

**Faculty Preceptor:** Dr. Elisabeth Barton  

**Title:** MID mice and craniofacial effects  

**Introduction:** Previous studies have confirmed that various forms of insulin like growth factor (IGF-I) contribute to the stimulation of muscle growth as well as the role of masticatory muscle strength as a significant influence on the formation of the mandible during growth. This project aims to continue to explore the dynamic between IGF-I, muscle growth, and bone development.  

**Objectives:** Determine if deletion of the Igf1 gene and the resulting diminished levels of local IGF-I will lead to mice with smaller skulls when compared to wild type mice.  

**Methods:** Two groups of mice will be used for this project: a group of 4-week-old mice and a group of 8-week-old mice. Within each group, there was a mixture of wild type mice and MID (muscle Igf1 deficient) mice. The mice were sacrificed at either 4 or 8 weeks. The skulls and masseter muscles were harvested as well as several other muscles and bones to be used in other areas of research. Once removed, the master muscles and skulls were weighed. Predetermined craniofacial landmarks on the skulls were visualized with coordinates using μComputerized Tomography imaging and the OsiriX program.  

**Results:** The 4 weeks old MID mice showed a lower body weight when compared to the wild type mice. The MID mice also had a lower masseter mass.  

**Conclusions:** More statistical analyses have to be conducted on the craniofacial measurements to determine if skull size is significantly smaller in MID mice when compared to wild type. However, preliminary data looks promising. Continued research is needed to truly uncover the relationship of muscle on bone growth. The information obtained from this research can shape the way understand growth and development as well as orthodontic treatment in dentistry.
Student: Catherine Campbell

Faculty Preceptor: Dr. Elisabeth Barton

Title: Relationship between MKR mice lacking IGF-1 receptors in masseter muscle and impacts on craniofacial bone growth

Objectives: The goal of this study was to determine the role of insulin-like growth factor-1 (IGF-1) in muscle development by exploring the relationship between mice lacking IGF-1 muscle receptors and surrounding craniofacial bone growth. 

Introduction: Muscle and bone have interrelated roles critical to proper growth and development. Previous research has established the positive impact of muscle mechanical force exertion on surrounding bone growth. In addition to muscle mechanical force, recent studies have focused on hormonal contributions to muscle development and bone shift. The liver is the main endocrine source of circulating insulin-like growth factors in the body. In addition, muscle produces its own local, or paracrine, source of IGF. IGF is critical for muscle physiology through stages of myoblast proliferation, differentiation and final function. Furthermore, IGF is critical in muscle fiber formation and protein synthesis. This project explored the relationship of muscle and bone, and whether endocrine or mechanical influences play a more significant role in craniofacial bone growth.

Methods: A total of twenty mice, ten wild type (WT) and ten MKR mutants, were injected with the self-complementing adeno-associated virus (scAAV) harboring the cDNA for murine IGF-1. One set of mice, four WT and four MKR, received the injection 4 weeks prior to sacrifice, while the second set received the injection 8 weeks prior to sacrifice. Four mice, two WT and two MKR from 4 and 8-week time points, served as controls receiving saline injections. Injections were introduced to the masseter muscle unilaterally. Following sacrifice, dissection of masseter muscle was performed, muscle mass was recorded and blood serum samples were collected. ELISA testing was performed on the serum and muscle samples to measure IGF-1 content. All samples were stored at -80 degrees. Mouse skulls were collected and fixed prior to micro-computer tomography (μCT) imaging.

Results: Muscle mass and ELISA data analysis confirmed hypertrophy in WT mice at both 4 and 8-week time points compared with MKR mice samples. This confirmation is consistent with our hypothesis that MKR mice lacking IGF-1 receptors would not see an increase in masseter muscle mass despite overexposure to IGF-1 through injection. Blood serum ELISA analysis confirmed there is no dependence of circulating IGF levels on muscle injection. Both WT and MKR samples did not result in significantly elevated levels of circulating IGF after masseter muscle injection.

Conclusions: Result collection and analysis for this project are ongoing. Future data analysis will focus on the comparison of angle measurements from plotted cephalometric landmarks to determine the impact of masseter muscle hypertrophy and IGF levels on craniofacial bone growth. Findings from this study will have relevant dental implications as a less invasive or complement procedure to orthodontic treatment and orthognathic surgeries.
Student: Parul Sangwan

Faculty Preceptor: Yan Yuan, Department of Microbiology, School of Dental Medicine, University of Pennsylvania, Elizabeth Cramer

Title: The Role of RIG-I and YY1 in Up-Regulating MiR-190 in Type 1 Latent EBV Infected Cells

Introduction: Epstein-Barr Virus (EBV) is a member of the γ-herpesvirus subfamily that has been implicated in the pathogenesis of several human malignancies including Hodgkin’s disease, Burkitt’s lymphoma (BL), nasopharyngeal carcinoma (NPC), and post-transplant lymphoproliferative disease (NHL). EBV infects nearly ninety percent of the human worldwide population and establishes three different kinds of latent infection in B cells. We studied the way in which EBV maintains type 1 latency through the use of microRNAs. Previous work has identified a microRNA unregulated in type 1 latency, miR-190. MiR-190 down-regulates cellular genes, which activate the lytic cycle or induce apoptosis and thus plays a role in maintaining EBV type 1 latency. / / Objectives: We hypothesized that in type 1 latency, EBV expresses EBERs (EBV encoded small nuclear RNAs), which activate the cellular RNA sensor, retinoic acid-inducible gene I (RIG-I), which in turn activates Yin Yang1 (YY1), a cellular transcription factor. YY1 then activates the talin 2/miR-190 promoter, leading to the expression of miR-190. To test if miR-190 is responsive to RIG-I and YY1 expression, we knocked down the expression of RIG-I or YY1 in EBV positive type 1 cells (Akata EBV positive and Sav I cells, respectively). / / Methods: We transfected 293T cells and then conducted a knockdown via shRNA lentiviral vectors. We used puromycin to select cells with the shRNA, performed a western blot to confirm the knockdown, and then examined shRNA-expressed cells for miR-190 expression by Taqman quantitative RT-PCR. We also deleted the YY1 binding motif within the talin 2 promoter and used a luciferase assay to analyze the effect on talin 2 promoter activity. / / Results: The data shows a decrease in miR-190 expression with the knock down of YY1 or RIG-I in type 1 cell lines, suggesting their involvement in miR-190 expression. To confirm the knockdown results, we used a deletion of YY1 binding motif. Deletion of this motif resulted in decreased talin 2 promoter activity, indicating that miR-190 expression is responsive to YY1. / / Conclusion: RIG-I and YY1 play a role in miR-190 up-regulation in type 1 latent EBV infected cells.
Student: Alexander Krisko

Faculty Preceptor: Dr. Elisabeth Barton

Title: Evaluation of the role of gene expression in dentofacial deformities

Objectives: This project set out to compare gene expression in masseter muscle samples taken from the right and left sides of the face in patients with facial asymmetry. In doing so we hoped to identify developmental and functionally expressed genes that had an impact in the development of facial asymmetry. //Introduction: Dentofacial deformities are often defined as imbalances in position, size, shape, or orientation of the bones comprising the jaw. Currently about 20% of the population is said to be affected by some type of dentofacial deformity, and about 2% of the population will need surgery to correct these deformities. (Wolford LM, Fields RT 1999). Deformations, most notably mandibular prognathism, have been linked to genetic factors and masticatory muscle strength (Rowlerson A, et al. 2005). These findings collectively indicate that genetic and environmental factors are interrelated in the development of dentofacial abnormalities and facial asymmetry (Miyatake E, et al. 2003). Identification of genes responsible for facial asymmetry could have potential use in future treatment of the disease. //Methods: Frozen masseter samples of facially symmetrical and asymmetrical patients were first obtained from the Sciote Lab at Temple University. RNA was extracted and isolated from the muscle samples using Trizol reagent. RNA was then quantified via absorbance spectrometry and subsequently subjected to RT-PCR to make the cDNA sequences. The cDNA was then subjected to quantitative PCR with primers designed for IGF-1, EGR-1, PITX2, PITX3, NODAL, SMAD2 and SMAD3 genes. HPRT1 was used as a housekeeping gene to normalize the data. //Results: Quantitative PCR results were inconclusive, with undetectable levels of gene expression for many patients or variable levels of expression between samples run in duplicate. However consistent data was found for two genes in two subjects in the study. After normalization against the housekeeping gene, the NODAL gene was upregulated 10-12 fold in both subjects on the side of the face opposite the jaw deviation. Similarly, the EGR-1 gene was expressed between 1.3 and 6 times more on the side opposite the deviation. //Conclusions: While the majority of the results were inconclusive due to varying data, repeated elevations in EGR-1 and NODAL genes on the side opposite the jaw deviation provide a direction for future study. It is difficult to isolate exactly where the error in the experiments arose that led to inconclusive data. A possible source of error includes poor quality of RNA due to: delay in snap freezing samples after removal from the patient, homogenization & isolation technique, or contamination of RNA with the agent used to fix the muscle to cork discs. Regardless, the data that was obtained indicates that future experiments exploring the expression of NODAL and EGR-1 in asymmetrical patients may prove fruitful.
**Student:** Yoojin Rhee

**Faculty Preceptor:** Dr. Kelly Jordan-Sciutto, Ph.D. and Dr. Cagla Akay Espinoza, M.D.

**Title:** The Effect of Depression on Expression of the Cell Cycle Protein E2F1 in the Central Nervous System

**Introduction/Objective:** Major depressive disorder is a debilitating chronic condition with a wide range of symptoms, including insomnia, loss of appetite, aches, or even thoughts of suicide. The numerous etiologic factors of depression—likely a combination of genetic, psychological, environmental, and biological—can make it difficult to diagnose and treat depression, as there are currently no biological tests or neurological presentations that can confirm its presence. While the molecular mechanisms of depression are not clear, there are numerous studies demonstrating a high co-occurrence of neurodegenerative disorders and depression. Importantly, neurodegenerative disorders which may present with depression, such as Alzheimer’s and Parkinson’s Diseases, share several common pathologic features, including oxidative damage, synaptodendritic loss, and neuroinflammation, and show increased immunoreactivity for two cell cycle transcriptional regulators, hyperphosphorylated Retinoblastoma Susceptibility gene product (ppRb) and the E2F1 transcription factor, both of which play a role in activating gene expression necessary for normal cell cycle progression. In this study, we tested our hypothesis, which stated that the expression of E2F1 is dysregulated in the CNS in depression. 

**Methods:** Formalin-fixed, paraffin-embedded cortical brain tissue slices from four macaques exhibiting depressive-like behavior, four macaques exhibiting depressive-like behavior but treated with opioid-receptor antagonist Naltrexone, and two controls were deparaffinized by Histoclear, hydrated by reverse alcohol washes, and immersed in H2O2 to allow for inactivation of endogenous peroxidase activity. Antigens were unmasked by immersion in a citrate-based target retrieval solution, and non-specific antigenic binding was blocked with incubation in a PBS solution containing 10% normal goat serum. Antibodies to E2F1, MAP2, DAPI, and GFAP were used to detect E2F1, neurons, nuclei, and astrocytes, respectively, using the tyramide amplification system with secondary fluorescent antibodies to allow for visualization by fluorescence detection. The samples were mounted in gelvatol, and 10 images were captured at 600X magnification from each brain region (cortical grey matter, cortical white matter, and hippocampus) using quadruple-labeled laser confocal microscopy with uniform settings. Metamorph Imaging software was used to quantify E2F1, MAP2, DAPI, and GFAP, using uniform threshold settings.

**Results:** There was a statistically significant decrease in E2F1 expression in both the neurons and astrocytes of depressed macaques. This decrease was not alleviated in the depressed macaques treated with Naltrexone, despite the observed reversal in depressive-like behavior.

**Conclusion:** Decrease in E2F1 suggests that there may be different molecular mechanisms at play leading to altered cell cycle protein expression in depression, from those observed in other neurodegenerative diseases.
**Title:** Suprathreshold Odor Perception and Memory During Pregnancy

**Objective:** The goal of this study was to determine the effect of pregnancy on olfactory function using well-validated tests of suprathreshold odor perception. / 

**Introduction:** Pregnant women have an increased risk for oral health complications due to morning sickness and altered food consumption that create an acidic oral environment. Nausea and vomiting afflict about three-quarters of pregnant women and may be linked to increased smell sensitivity. However, any connection between the two is based mainly on anecdotal evidence and a concrete mechanism has not been established. Studies on olfaction during pregnancy are limited and the results have been equivocal. To date, studies on the influences of pregnancy on suprathreshold odor intensity (the increase in perceived intensity of odors as their concentration increases) have not been performed. A better understanding of olfactory function during pregnancy and the link between olfaction and nausea and vomiting is important for understanding and managing maternal nutritional status, which may well impact oral health. / 

**Methods:** A total of 29 women ages 21-45 were recruited to perform 2 smell tests and complete a questionnaire on nausea and vomiting. The women were either pregnant in their first trimester (n=11) or non-pregnant (n=18). The Odor Memory Test (OMT) and the Suprathreshold Odor Rating Test (SORT) assessed odor discrimination and perception, respectively. The 24-Hour Pregnancy-Unique Quantification of Emesis (PUQE-24) assessed severity of morning sickness. / 

**Results:** The pregnant women scored significantly higher than non-pregnant women on the OMT (p=0.03). There were two outliers in the non-pregnant group; exclusion of these resulted in a non-significant difference between the groups. No difference was seen between the two groups on the SORT. Mean intensity ratings increased and pleasantness ratings decreased with increasing concentration for both pregnant and non-pregnant women. Pregnant women scored significantly higher (p=0.0003) than non-pregnant women on the PUQE-24. Average scores for both groups of women were in the “mild” range for nausea severity. There was no correlation between this score and those of either the OMT or the SORT. / 

**Conclusions:** The OMT scores suggest that pregnant women may exhibit increased odor memory and discrimination compared to non-pregnant women. However, the lack of significance when excluding the outliers indicates the need for more data collection. The SORT scores suggest that odor perception (in terms of intensity and pleasantness) is not altered during pregnancy. It is possible that the lack of correlation between nausea and vomiting and the olfactory tests was due to the predominance of “mild” severity scores; the pregnant women may have been very early in their pregnancy before the occurrence of morning sickness. A larger sample size is needed for a more definitive analysis. The results of this study, especially those of the OMT, are promising and should be further pursued in order to determine the effect of pregnancy on smell function.
Student: Shutong Zhan

Faculty Preceptors: Francis Mante, Department of Preventive & Restorative Sciences; Markus Blatz, Department of Preventive & Restorative Sciences; Joseph DiRienzo, Department of Microbiology; Fusun Ozer, Department of Preventive & Restorative Sciences

Title: Influence of PVM/MA Copolymer on Adherence of *Streptococcus Mutans* to Resin Bonding Applied Surfaces

Objective: The study investigated the surface roughness of a one-bottle adhesive bonding agent by incorporating a copolymer of methylvinyl ether and maleic acid (PVM/MA), and its antibacterial activity in preventing colonization of the dentin and resin composite surfaces by cariogenic *Streptococcus mutans* biofilms. / /Method: Twelve composite-resin (Estelite Omega, Tokuyama Dental) discs (diameter 8 mm, thickness 2 mm) were made. Dentin samples (n=12) were cut up into rectangular prisms (2 x 2 x 1mm) from caries-free extracted human molars and then polished. Adhesive bonding agent Prelude One (PO; Danville Materials) was applied to acid etched dentin and composite surfaces with or without incorporation of PVM/MA copolymer in the bonding material. Surface roughness of the bonding-agent-treated surfaces were determined through a stylus profilometer (KLA-Tencor P7 stylus profiler, Milpitas, CA, USA). Bacterial adherence to surfaces was assessed by determining colony-forming units (CFU) and viewing by scanning electron microscopy (SEM). The specimens were sterilized by UV irradiation before incubation with bacteria and then immersed in sterilized whole saliva for 2 h and placed in individual wells containing 1 x 10^8 cells/ml of *S. mutans* in PBS. Immersed specimens were incubated at 37°C for 4 h and washed with PBS to remove unattached bacteria. Specimens were then placed into tubes containing 1mL of PBS. Attached bacteria were dispersed by sonication. Serial dilutions were made and spread onto Brain Heart Infusion Broth plates to determine CFU. For SEM analysis, three specimens prepared the same as for CFU counting were immersed in Karnovsky’s fixative for 24 h, coated with gold-palladium. Data were analyzed with ANOVA and Tukey’s test (p<0.05). / /Results: Integration of PVM/MA into PO increased the surface roughness of both composite and dentin surfaces by 4.6 and 4.4 times, respectively, compared to application of PO alone. Despite the increase in surface roughness, incorporation of PVM/MA in PO decreased colonization of composite and dentin surfaces by *S. mutans* biofilms by 2.1 and 3.3 times, respectively, compared to application of PO alone. SEM images also confirmed these results showing reduced bacterial attachment to adhesive resin applied surfaces. / /Conclusions: Integration of PVM/MA into dentin bonding agents has shown antibacterial effect, which helps to reduce plaque retention by inhibiting the initial adhesion of bacteria onto the surface of dentin and composite materials. The development of this new antibacterial bonding agents is likely to reduce the occurrence of secondary caries, and have great impact on improving oral health.
Student: Je Dong Ryu

Faculty Preceptors: Mohammed Al-Harbi, Dana T. Graves
Department of Periodontics, School of Dental Medicine, University of Pennsylvania, USA

Title: The role of FOXO-1 expressed by chondrocytes in diabetes-impaired fracture healing

Introduction: Type 1 Diabetes (DM) is a chronic disease that is characterized by elevated blood sugar levels. One of many complications associated with uncontrolled diabetes is delayed fracture healing. Both in vivo and in vitro studies showed that many factors contribute to the impaired fractures healing. Our previous in vivo study showed that Diabetes was associated with early cartilage removal in the healing callus, that early cartilage removal was associated with increased osteoclastic activities. In addition we showed that there was marked increase in inflammatory cytokines and chemokines. Those elevated inflammatory makers were mediated in part by Forkhead box class O1 (FOXO1). In the current study, we want to investigate the effect of FOXO1 expressed by chondrocytes on the fracture healing using diabetic mouse model. We hypothesized that FOXO1 in chondrocytes plays a key role in early cartilage removal.

Materials and Methods: An experimental mouse model was used to test the implication of FOXO1 in fracture healing. Col2a1Cre+/FOXO1 L/L and Col2a1Cre-/FOXO1 L/L mice were used. Type 1 diabetes was induced by giving multiple intraperitoneal injection of streptozocin and the control mice were injected with the same amount of vehicle alone. Mice were considered diabetic when the blood glucose level was >250 mg/dL for 2 consecutive readings. After being diabetic for 3 weeks, femoral fracture was induced. The femurs were harvested at 3 different time points (Day 10, Day 16, and Day 22). The samples were scanned with Micro CT to assess the healing radiographically. The samples were then imbedded in Paraffin and sectioned for histological evaluation. To study the osteoclast count Tartrate-Resistant Acid Phosphatase (TRAP) stain was used. Osteoclast count was calibrated with a skilled technician. Safranin-O-Fast Green stain was used to measure cartilage area within the healing callus.

Results: Both diabetic Cre- and normoglycemic Cre- mice show 4% difference in cartilage area (p>0.05). However, diabetic Cre+ mice show 42% less in cartilage area compared to normoglycemic cre+ mice (p<0.05). For osteoclast count, diabetic cre+ mice had a 2.1 fold higher osteoclasts compared to normoglycemic cre+ mice (p>0.05). Similarly, the number of osteoclasts in diabetic cre- mice was a 1.9-fold greater than normoglycemic cre- mice (p>0.05).

Conclusion: FOXO1 clearly plays a role in early removal of cartilage by regulating osteoclastogenesis. Future work will be done to analyze Day 16 and Day 22 samples.
Clinical Honors Program
Abstracts
Student(s): Maral Mobasher

Title: Save A Tooth Project: Bulky Long-Term Provisional Restoration Instead of Surgical Crown-Lengthening

Introduction: Mrs. W is a 55 yr old AA female patient. She is happily married and has 2 children. She is a middle school teacher with limited time. She does have dental insurance. She is motivated, curious. She came to ADCC with chief complaint “My lower left tooth broke off, it has been filled many times but broke again.”

Current Condition and Past Medical History: HPI: Pt. came to ADCC for delivery of #7 crown and she expressed that #20 had fractured. #20 was root canal treated, but never received a crown and bonded restorations continually fractured. Patient is partially edentulous and is missing #19, 29, and 30. #21 has craze lines and a questionable composite restoration.

Current Medical Status: Patient is currently in good health and stable. She suffers from hypothyroidism and is being treated by Synthroid (Levothyroxine) 1.

Past Medical History: Patient was diagnosed with Graves Disease in 1992, which is an autoimmune disease that causes hyperthyroidism. Her thyroid was ablated in 1996, which caused hypothyroidism. This was treated by synthetic T4 (Synthroid).

Treatment Plan and Goals: Goals were to restore patient’s posterior support, replace missing spaces, and achieve a balanced occlusion. Treatment Plan: Pt. accepted the gold treatment plan: Phase I: Prophylaxis/Fluoride, Buildup #20, 21, Crown lengthening on #20 ML / Phase II: Implant + crown # 19, 29, 30, Crowns on # 20, 21 / Maintenance: 6 months recall / #20 has 5 mm D recession, no mobility and required crown lengthening on the ML. Instead of a surgical procedure, a bulky provisional on the ML was fabricated which pushed the gingiva and the accompanying bone after long-term use. A zirconia crown was fabricated. Bone sounding was used to make sure the biological width wasn’t violated.

Conclusions: A small area of gingiva can be pushed down with assistance of a long-term bulky provisional restoration. The bone follows the soft tissue and the biological width will not be violated. This saved #20 which had sufficient bone and fair prognosis.
**Student(s):** Jee Hye Choi  

**Title:** Save a Tooth Project: Case Report on Mr. C  

**Introduction:** Mr. C presented to PDM Honors Clinic November 2014 seeking care. Patient had chief complaint of needing routine dental care since last visit 6 months ago.  

**Current Condition and Past Medical History:** Patient is periodontally stable with mild generalized gingivitis and localized chronic periodontitis in upper and lower posterior dentition. Patient has noncontributory medical history, and does not take any medications. Patient denies any known drug allergies. Patient had multiple class V caries and recurrent caries at margins of existing crowns. During the course of phase 1 treatment, previously RCT #13 with a large DO amalgam fractured necessitating immediate treatment.  

**Treatment Plan and Goals:** Health promotion plan and dietary counseling was completed. During dietary counseling it was deduced that one of the main causes of his recurrent and class V caries was his habit of continuously eating breath mints. Patient was instructed to decrease frequency of mint intake as well as recommended on purchasing sugar free mints. Treatment plan options to restore #13 which fractured during phase 1 treatment were provided, including RPD, extraction and implant, or post core and crown. Patient declined treatment plan involving a removable prosthesis and implant was not feasible due to financial constrictions. Patient opted for post core and crown. Treatment goals include removing active caries, preventing future caries (via dietary education, oral hygiene instruction, and regular recall visits), and preserving as many of his natural dentition as possible since patient adamantly disliked the idea of a removable prosthesis.  

**Conclusions:** This Save-a-Tooth project is currently in progress and has a moderate prognosis.
Student(s): Suzanne George

Title: Treatment planning

Introduction: A 68 y/o Caucasian male comes to SDM with the chief complaint "I want to know what treatments I need to get." His last dental visit was in December of 2013. 

Current Condition and Past Medical History: Past medical history includes high blood pressure / hypertension. Patient is on 7.5mg of Amlodipine to control his hypertension. Upon clinical examination of the patient, evidence of multiple class 5 lesions from abfraction were evident. There is also evidence of attrition. Tooth #28 has a very short clinical crown with carious class 2 lesion on the mesial of the tooth. Before caries removal, the clinical crown on the buccal measured 2mm and on the lingual measured 1mm. 

Treatment Plan and Goals: Treatment plan included removing excessive occlusal forces using selective grinding. Attrition was addressed by using composite restoration and fabricating an occlusal guard to prevent future attrition from bruxism. Caries removal was the first step of treatment for #28. Probing depths on the buccal was 222 and the lingual was 212. The biologic width of a tooth is the distance established by the junctional epithelium and connective tissue attachment to the root surface of a tooth1. This distance is important to consider when fabricating dental restorations because they must respect the natural architecture of the gingival attachment if harmful consequences are to be avoided. Based on the 1961 paper by Gargiulo, the mean biologic width was determined to be 2.04 mm1. When restorations do not take the biological width into account, chronic pain, chronic inflammation of the gingiva, unpredictable loss of alveolar bone occurs. In addition to crown lengthening, to establish a proper biologic width, a 2 mm height of tooth structure should be available to allow for a ferrule effect2. After caries removal, the mesial of tooth #28 was determined to not have enough ferrule for placement of a crown. Placing a crown without periodontal considerations would violate the biological width of the tooth. Patient refused to consider orthodontics as an option. Therefore, intentional endodontics, post placement along with crown lengthening and crown build up was suggested. This gives the adequate support and retention for crown placement.

Conclusions: Sub marginal incision was made lingually and a Sulcular incision was made buccally on #28. A flap was reflected. About 2 mm of bone was removed around #28. On #28, BMI was to #35.04mm. #28 post placement and composite crown build was then completed. Crown prep, temporary crown placement, Final impression for a PFM crown, metal try-in and final delivery followed in the next visits. The treatment was a success. All excessive occlusal forces were removed using selective grinding. No mobility was noted upon treatment completion. Tooth #28 now has 3 mm ferrule and the biological width is now re-established through the crown lengthening procedure.
Student(s): Atoosa Pahlavani

Title: Saving a tooth and correction of the occlusion for a patient after 4 years of Orthodontic treatment

Introduction: A 29 y/o male presented to SDM since 12/01/2010 for orthodontic treatment and placing implant for tooth#10 (he had a primary tooth instead of #10). / / Current Condition and Past Medical History: Patient does not have any medical issues, he had some restorative and periodontal treatments done since he came to SDM. Patient had gingivectomy / frenectomy surgery on 06/24/2013 and First Implant placement for #10 was on 07/22/2013, implant failed on 09/23/2013 and placed the new implant again with bone graft on 2/02/2014. Tooth # 9 had short root since the beginning of treatments (c/r=1/2), but at the end of his orthodontic treatment that ended in 11/14/2014 tooth #9 was completely mobile (grade 4), (c/r =1/1). / After almost 4 years of orthodontic treatment, patient did not have canine guidance occlusion (canines did not have contact in different movements of jaws). This was the reason that incisor teeth got mobility due to lots of work load, we started to correct his occlusion with restorative plans, we added composite on buccal and lingual of all 4 canines to establish canine relationship (canine guidance) and we make sure that there is no contact on the teeth on the nonworking side, so the workload become less on the incisors, and the force will be distributed on teeth (Mutually protected occlusion). / Goals: Find the basis of the patient’s problem, give him a better occlusion and replacing his tooth #10. / Conclusions: Pay more attention to overall and basis problems of patient and do not only focus on restoring and aligning teeth or do periodontal treatments. Some patients have severe occlusal problems that may have sever effects on their TMJ and survival of their teeth and bone.
Student(s): Dayoung Jessica Song

Title: Root-supported overdenture using locator attachments

Introduction: As dental professionals, it must be our primary goal to relate to patients’ concerns both physically and psychologically in order to deliver the best treatment that is catered to their personal needs and resources. 77 y.o patient Mrs. C presented to PDM with cc: “I have pain in the lower front and I want dentures.”

Current Condition and Past Medical History: Intraoral findings showed edentulous arch on the upper and #22-26 on the lower. #24 had periapical pathology and with mobility grade 3. Her medical history included hypertension and arthritis.

Treatment Plan and Goals: Finalized treatment plan was geared toward minimizing surgical procedures utilizing conservative methods as per patient’s wish, while accommodating her limited financial resources. Patient accepted the treatment plan to rehabilitate esthetics and function with upper complete denture and lower root-supported overdenture with locator precision attachment. The idea of overdenture and retaining teeth has been around for 150 years. Extraction of teeth result in irreversible resorption of residual alveolar ridge and the rate of resorption in the mandible is four times that of the maxilla. More bone loss occurs in the anterior part of the mandible, thus retaining teeth in this region significantly benefit patients. Furthermore, conventional mandibular complete denture has problems with retention and stability causing discomfort, patient dissatisfaction, and loss of confidence in dentist. Therefore, we utilized radicular locator attachments for improving denture retention.

Conclusions: Alternative option could have been implant-supported overdenture, which patient declined due to the cost and surgical aspect of treatment. For root-retained overdentures, regular follow-up appointments and excellent home care maintenance are most critical factors to success as periodontal disease and root caries are most common reasons for abutment teeth failure. With Mrs. C, daily fluoride regimen was given (Prevident 5000) and detailed oral hygiene instruction was heavily stressed.
Student(s): Madelaine Driskill

Title: Labial Tipping of Maxillary Central Incisor with Spring-Loaded Removable Orthodontic Appliance

Introduction: Mrs. R, a 51 year old white female, reports to the Advanced Dental Care Center in October 2015 with chief complaint, "I fell off my bike when I was 9 years old and damaged my front tooth. It had a root canal, a post and a crown, but I don't like the way it looks. It's longer than my other front tooth and farther back." / 

Current Condition and Past Medical History: Mrs. R has had regular dental care since she was a child and has excellent oral hygiene. She has no active caries, no active periodontal disease and a minimally restored dentition. She is at low risk for caries and periodontal disease. She has no active medical conditions, no current medications, no known drug allergies and a review of systems is within normal limits. #9 was fractured in a bicycle accident 42 years prior at which time root canal treatment was performed, a post was placed and the crown was restored. 35 years ago, #9 was restored with a PFM crown. Her main dental concern is the lingualized position and supra-eruption of #9 in addition to the unaesthetic shade and contour of the PFM crown on #9. Radiographic analysis shows #9 with a fair crown:root ratio, distal tilting and no ankylosis or evidence of pathology. #9 is not cold, percussion or palpation sensitive. The marginal gingiva on the facial of #9 appears inflamed with rolled borders and bleeding on probing. Mrs. R is not interested in comprehensive orthodontic treatment due to financial concerns and time commitment. / 

Treatment Plan and Goals: The goals of treatment are to labially tilt #9 with a spring-loaded removable orthodontic appliance in order to reposition the tooth in an ideal buccolingual plane for a new crown restoration. The goals of treatment are to position #9 to be re-crowned with ideal crown bulk, contour, esthetics and function. In addition, increased facial support of the marginal gingiva and ideal crown margins aim to improve gingival health around #9. / 

Conclusions: Mrs. R wore the removable appliance for 22 hours everyday for approximately two months. In that time, #9 tilted facially with the incisal edge moving anteriorly 2-3 mm in the buccolingual plane. After adequate tooth movement, the PFM crown on #9 was removed and #9 was provisionalized with Integrity. Mrs. R was very pleased with the esthetics of the provisional. Two week after provisionalization, gingival health will be evaluated, the tooth will be prepared for the final restoration and a new provisional with ideal esthetics and function will be fabricated and cemented. Ultimately, a definitive crown will be fabricated and cemented.
Student(s):  Andrew Janiga

Title:  A Conservative Approach to Restoring Esthetics and Function

Introduction:  A range of different treatment options are available when attempting to improve the esthetics and function of natural teeth. This case study looks at a conservative approach using bonded composite resins to restore carious teeth, replace poorly contoured existing restorations, and close diastemas between maxillary anterior teeth. /  

Current Condition and Past Medical History:  Patient presented with defective restorations, caries, and localized diastemas. No significant medical issues were noted, and no medications were being taken. /  

Treatment Plan and Goals:  Treatment planning focused on restoring the patient to a state of oral health while simultaneously addressing his concerns with esthetics. Treatment options of orthodontics, veneers, ceramic inlays, and composite restorations were discussed with the patient. /  

Conclusions:  Patient elected to keep restorative and esthetic work as conservative as possible. This led to approaching the patient's treatment by using conservative resin restorations to restore function and esthetics.
Student(s): Hasim Momin

Title: Treatment Planning of a Patient with Xerostomia and High Carries Risk

Introduction: A 44 y/o AA F presented to PDM w/ CC, “I need dentures, and I was not happy at my previous dental clinic”. Patient (pt) was partially edentulous on both jaws. Pt had previous dental visit at another clinic but was not happy with treatment provided. Pt denied any pain, fever, chills or swelling but was complaining of severe dry mouth. / / Current Condition and Past Medical History: Pt's medical history includes rheumatoid arthritis (RA), sjogren's syndrome (SS), thalassemia, asthma, GERD, and depression. Pt was on multiple medications including prednisone, methotrexate, hydroxychloroquine, omeprazole, cevimeline, vicodin, ibuprofen, albuterol, folic acid, Vitamin D and calicum. Due to SS and poly pharmacy pt was experiencing xerostomia which along with her diet contributed to patients high carries risk. Pt had decay on nearly all her teeth (11 out of 14 teeth). Pt's carries risk was extreme (score of 40). Pt's risk for periodontal disease was high (score of 12). / / Treatment Plan and Goals: Pt was multiple treatment plans to address her chief complaint as well lower her carries risk. To lower carries risk several guidelines were followed. Pt was put on 3 month recall visit with frequent of radiograph at 6 months. Pt was recommended to use 0.05% sodium fluoride rinse twice daily. It was also recommended to the patient to use power tooth brush and improve their OH techniques. Pt was also recommended to use salivary substitute, like Biotene. Due to pt's high periodontal risk, she was prescribed 0.12% chlorhexidine rinse twice daily. Due to loss of upper posterior teeth, pt had posterior bite collapse. Missing teeth maxilla: #s 1-5, 7 and 12-16. Missing teeth mandible: #s 17-19, 23-26 and 30-32. Pt has generalized plaque and poor oral hygiene. Ideal treatment plan included restoration of VDO with implant supported bridges as well as a 6 unit anterior bridge. Alternative treatment plan included maintaining the VDO and replacing the missing teeth with upper and lower RPDs. Pt had initially opted for the alternative treatment planning due to financial considerations. Phase I treatment was begun including SRP, prophy, extractions and restorations. / / Conclusion: With thorough collection and evaluation of data, multiple treatment plans can be generated but factors including health condition, habits, socioeconomic status and patient preference dictate which plan is preferred and rendered to the patient.
Student(s): Evan Eisler

Title: Complications of Intentional Reimplantation: A Procedure of Last Resort

Introduction: Intentional replantation is defined as the purposeful removal of a tooth followed by reinsertion into its own alveolus after sealing the apical foramina. In this case study, intentional replantation is described and discussed as a treatment approach for failed root canal treatment and subsequent failed re-treatment in a region inaccessible for apical surgery. /Treatment: What makes this case study unique is that the mesial buccal root of a three-rooted, maxillary second molar fractured during the initial extraction. The apical portion was retrieved and discarded, and the remaining root was endodontically sealed. One, three, and six month re-evaluations revealed no mobility and no patient discomfort, but an enlarging radiolucency apical to the fractured root. Subsequent MB root amputation, crown lengthening, crown preparation and provisionalization were performed and assessed radiographically. /Conclusion: The patient presented for delivery of the definitive restoration one year post-intentional replantation noting discomfort and mobility. A periapical radiograph noted evidence of external root resorption and a fracture distal buccal root. The tooth was deemed non-restorable. Indications, limitations, complications and recommended literature of intentional replantation are to be discussed below.
Introduction: A 67 year old Asian male patient presented to the SDM clinic for recall visit. The patient did not have any chief complaint, but wanted to get cleaning. During the clinical exam, mobility grade 1 was found on #8 and #9. These two teeth were traumatized about 30 years ago, and intra-alveolar root fracture occurred along the mid 1/3. Pain (-), swelling (-), percussion (-), palpation (-).

Current Condition and Past Medical History: Pt showed no signs of swelling, pain or infection. PMH includes high cholesterol and benign prostate hypertrophy. These conditions are well controlled by fenofibrate and finasteride, respectively. No known drug allergy reported. No significant findings on extra-oral exam. Recent dental history includes extraction on #2 due to vertical fracture along furcation, root canal treatments on #3 and #10, and full metal gold crown on #14 and #18. Maxillary anterior periapical radiograph shows the intra-alveolar root fracture along the mid 1/3 on #8 and #9. Clinical findings include probing depth ranging from 3 to 6 on #8 and #9, mobility 1, bleeding on probing, and vitality (+).

Treatment Plan and Goals: Patient's specific information (i.e. chief complain and HPI) was collected to come up with a list of tentative treatment plan options. The treatment plans were evaluated based on the four criteria: (1) esthetics, (2) function, (3) structure, and (4) biology. Esthetics include uneven gingival margin on #8 and #9 with 2 mm diastema. Function includes grade 1 mobility and out-of-occlusion with opposing dentition. Structure consists of apical ankylosis, no root canal treatments, and horizontal root fracture at mid to apical 1/3. Biology consists of periodontal probing 4 mm to 5 mm, percussion (-), palpation (-), cold (+) and vitality (+). Treatment plans include: (1) extract and place an implant, (2) extract and make a removable appliance, (3) remove the coronal fragment and make a bridge, and (4) leave as it is. Risks and benefits of each option were evaluated.

Conclusions: It was decided to leave the teeth #8 and #9 as they are due to patient's finance and condition of teeth. Even though it would be ideal to do an immediate placement of implants to preserve papilla and bone levels, the teeth were left as they were because the patient did not have any complain about esthetics, function, biology and structure.
Student(s): Benjamin Canary

Title: Treatment of Esthetic Zone Horizontal Root Fracture in a Teenage Patient

Introduction: CC (9/2014) / 16 year old Caucasian F presenting with mother with CC: “I fell off a roof a few months ago and broke my front tooth.” HPI: / In 8/2014, pt fell off the roof while playing with her siblings. Pt suffered a mandibular fracture, chin laceration, and trauma to teeth #7, 8, and 9. Teeth #8 and 9 were subluxed while tooth #7 suffered a horizontal root fracture in cervical/middle third. Pt seen in HUP/CHOP emergency department where mandibular fracture was stabilized, chin laceration was sutured, and teeth #6-11 were splinted using composite buttons and orthodontic wire. Root canal therapy completed on #8 and 9. / /

Current Condition and Past Medical History: Current Condition: (4/2015) / Pt has been debonded and no longer splinted #6-11. Tooth #7 has limited mobility (+1 or +2). Teeth #8 and 9 have been root canal treated and are stable. PMHx: / Pt is ASA I - no PMHx, no meds, NKDA. / / Treatment Plan and Goals: 1) Preserve bone in area of tooth #7 until the pt has stopped growing at which time the space can be restored with an implant crown / 2) To provide the pt with an esthetic restoration of tooth #7 until that time “Bury” Root, Maryland Bridge, and Implant / Remove fragment of tooth #7 coronal to the horizontal fx. Complete RCT on tooth #7 apical to the horizontal fx and restore with a coping. Shape crown of #7 into a pontic and bond to the adjacent teeth (#6 and 8) as a temporary Maryland bridge until the pt is old enough for an implant. Forced eruption, Crown, Anticipated Future Implant/ Remove fragment of tooth #7 coronal to the horizontal fx. Complete root canal therapy on tooth #7 apical to the horizontal rx and restore with a post and coping. Orthodontically erupt tooth #7 apical to the horizontal fx to expose enough tooth to restore with post/core/crown. Anticipate that #7 will eventually fail and tooth will be restored as implant crown after the pt has stopped growing. Leave tooth “as is” and Monitor tooth #7 to ensure mobility is not increasing and tooth has not displaced from current position. If tooth continues to be moderately stable, monitor with anticipation of eventual restoration with an implant crown once the pt has stopped growing. / / Conclusions: The oral and maxillofacial complex in many young, healthy patients has a remarkable healing capability. Since the traumatic incident occurred, this patient has healed well. An implant crown is likely the most predictable, long-lasting restoration for tooth #7 in the future. However, we must consider the best treatment for tooth #7 until the patient stops growing (roughly between 18-20 y/o). By using an interdisciplinary approach, we can provide this patient multiple treatment options that will both create an esthetic restoration in the short-term (2-5 yrs) while maintaining a healthy implant site to support a stable, long-term restoration.
Student(s): Alison Fishman

Title: Treatment Options for Congenitally Missing Laterals

**Introduction:** Patient presented to PDM post ortho treatment with congenitally missing laterals. Ortho moved canines to the lateral position and opened a space for replacing the canines. //

**Medical history non-contributory** // **Treatment Plan and Goals:** provide patient with restoration until growth has ceased and implants are more predictable. // Treatment plan: maryland bridges to replace canines at 6 and 11. Bonding on 7 and 10. // **Conclusions:** bonding issues with cements, occlusal considerations.
**Student(s):**  Tarik Elmohd

**Title:** Treatment of tooth #8: Orthodontic Eruption vs. Extraction/Implant

**Introduction:** 52 y/o AA Male pt Presents to SDM 12/2014 with CC: “I had a seizure and fell down the stairs and broke my front tooth”. **HPI:** Pt. fell the day prior to admittance to SDM due to grand-mal seizure. Fractured #8 Ellis III, #9 Ellis II, and #7 Ellis II. Pain scale: 4/10 on Percussion on #8&#9, 2/10 on #7. #9 was fractured in 3 parts, 2 buccal, and 1 palatal portion. Horizontal fracture line at the level of the crestal bone near the junction of the middle and cervical thirds. Pt showed deep concern with the esthetics of his smile. High smile line and thin scalloped gingiva and the position of #9 decreases the predictability of a final restoration. **Current Condition:** 12/2014-Immediate treatment included endodontic evaluation for possible vertical root fracture. No evidence of radiographic or clinical vertical root fracture was noted. PA film reveals horizontal root fracture, CBCT revealed thin cortical labial plate and labial fenestration at the junction of the apical and middle third. Pt was concerned about not having a tooth for the holidays. **Past Medical History:** Patient is ASA II with a history of petite mal and a recent grand mal seizure. Medications Include: Keppra (anti epileptic) w/no known drug allergies. **Goals and Treatment Options:**

1. Preserve the integrity of the buccal cortical plate and enhancement of possible implant site on #8. 2. Preserve the soft tissue and hard tissue integrity, architecture, and esthetics of #8 to provide a predictable and esthetic final restoration 3. Preserve the root #8 and extrude to gain approximately 1.7mm ferrule without hard tissue re-contouring.

**Treatment Option 1:** Atraumatic Extraction, Surgically Guided Immediate Implant Placement. Attempt atraumatic extraction of #8 in an attempt to preserve labial cortical plate. Surgically guided implant placement #8. Labial hard tissue graft labial aspect of implant site and membrane. Allow site to heal and provide patient with a Transitional appliance for #8. **Treatment Option 2:** Forced Eruption, Achieve Ferule, Post/Core/Crown. Remove all coronal sections of #8 above the fracture line. Root canal therapy and pre fab post placement with retrievable cement. Resin buildup and orthodontic eruption of #8 to achieve ferrule. Examine crow to root ratio restore with case post/core and final restoration with crown. **Treatment Option 3:** Forced Eruption for Implant Site Development, Extraction, Immediate Implant placement and Hard Tissue Augmentation. Remove all coronal sections of #8 above the fracture line. Root canal therapy and pre fab post placement with retrievable cement. Resin buildup and orthodontic eruption to enhance site for implant placement. Extract and immediate implant placement and allow site to heal and provide patient with a Transitional appliance for #8. **Conclusions:** As many factors dictate the esthetic outcome of the final restoration. With the factors that are presented with this patient, such as a high smile line, thin biotype, fenestrated cortical plate, and very minimal labial cortical bone, the esthetic outcomes of an extraction and implant placement are not predictable. Therefore, attempting to save the patients natural dentition with forced eruption and cast post and crown the outcome would be more esthetic and predictable. There is no substitute for the patients natural dentition making treatment option 2, the most feasible given the bodies response and reassessment of the health of #8.
**Student(s):**  Alice Bassani  

**Title:** Save-a-Tooth Case Presentation: Recurrent Root Caries  

**Introduction:** A 79y/o female has previously been seen at the dental school for multiple units of crown and bridge. Upon updating an FMX it was evident in 2014 that radiographically the margins of many of these crown were breaking down. Two teeth in particular: #13 and 14 had gross recurrent root caries, which became the priority for this treatment.  

**Current Condition and Past Medical History:** Pt has a history of heart disease. She takes 81mg Aspirin, 3mg Metoprolol, and 40mg Simvastatin.  

**Treatment Plan:** Focusing on teeth #13 and 14, they were temporarily restored with amalgam patches to address the caries. Knowing the poor prognosis of these teeth the patient understood that re-doing these crowns would be necessary. In order to create adequate ferrule and maintain the biologic width, crown lengthening would be necessary. In addition, the build-ups and posts would need to be redone before preparing the tooth and taking impressions for a full coverage crown.  

**Conclusions:** Knowing that the prognosis was poor for these teeth, the patient opted to save these teeth. The patient was not interested in extractions and implants or a bridge. Throughout each stage of treatment the prognosis improved as an interdisciplinary team addressed her concerns.
Student(s): Allison Lawrence

Title: Confidence and Canines: Restoring Maxillary Anterior Esthetics and Mandibular Canine Guidance

Introduction: Patient is a 56 year old Caucasian male who presents to the School of Dental Medicine (SDM) with a chief complaint of “I’ve been neglecting my teeth”. Patient is married, father of four, employed but lacks dental insurance. Esthetics are a high priority for him. The patient has not received any dental care in the past 6 years. // Current Condition and Past Medical History: The patient’s past medical history includes a history of heart disease. He had a repaired ventricular septal defect at age 9. The cardiologist confirmed this was completely healed and did not merit antibiotic prophylaxis according to the most recent guidelines. Additional medical problems include diverticulitis and high cholesterol. The only medications the patient currently takes are atorvastatin, 20 mg/day, and Aspirin 81 mg/day. The patient denied any allergies. The patient was in good physical condition, symmetrical, denied any pain, AAOx3, CNII-XII were grossly intact. Submandibular lymph nodes were bilateral, palpable, non-tender, mobile, and less than one centimeter. The patient’s dentition was heavily restored, partially edentulous, and had a unilateral cross bite. // Treatment Plan and Goals: The short-term goal of my treatment was to restore 6-11 to a desirable function and esthetics. The long-term goals of this patient’s care are to restore the anterior and posterior dentition to ideal form and function. Finances prevented the patient from pursuing treatment beyond periodontal care and 6-11 porcelain fused to metal crowns (PFM). The completed treatment included: OHI, 4 quads SRP, osseous surgery (Perio- post grad), 6-11 long term provisional, single unit PFM crowns on 6-11, #27 facial composite, #3 DOF composite. Ideally, teeth #18,21,22,17,28 would be restored with PFM crowns. The edentulous span for #29 would ideally be restored with an implant. // Conclusions: I restored this patient’s maxillary anterior to an appropriate esthetic and function. Canine guidance was restored on #27. The periodontal disease was reduced. Patient is ecstatic with his change in appearance. There is still work to be done but the patient’s dental form and function have been drastically improved.
Student(s): Wenting Guo

Title: Save a tooth and build a (Maryland) Bridge - A case report

Introduction: Ms. D is a 59 y/o Caucasian female, presented to PDM for comprehensive dental care in 2011. Ms. D didn’t follow up with her student dentist for 10 months after her #14 implant was removed in 2013. In the summer of 2014, she came back to PDM with chief complaint of “getting my cleaning and the implant bridge on my upper left”. / /Current Condition and Past Medical & Dental History: Ms. D has no significant medical history except experiencing sinusitis and currently under the care of her ENT doctor. She takes Flonase and Pseudoephedrine Hydrochloride prn and has a left sinus surgery scheduled in Nov, 2014. She has no known drug allergies. Ms. D has a history of generalized chronic periodontitis and had a series of periodontal treatment since 1980s. She was admitted to SDM in 2011, comprehensive care was rendered including 3-month periodontal maintenance, extraction of non-restorable posterior teeth and replaced with implant and implant crowns and bridge on #3, 19-21, 29, 30. Implants were placed on #12 & 14 but #14 was removed in Nov, 2013 due to failure of osteointegration. Patient notices that calculus always builds up fast on her teeth, especially on the mandibular anterior. Upon examination, patient was diagnosed with generalized severe chronic periodontitis (with periodontal mobility I to II, generalized 2-5 mm gingival recession and bone loss), distal caries and reversible pulpitis on #4, space between #23 and #24 due to drifting, and peri-mucositis and peri-implantitis on #19. / /Treatment Plan Goals and Options: It will be challenging to restore #4 conventionally without pulp exposure because #4 has an existing MO amalgam and a large distal cervical caries. Extraction and implant placement will be a more predictable because #4 has an unfavorable crown-root ratio for crown after RCT. Sinus lift will probably need for implant placement. is too small for a single implant placement. Treatment plant option includes splinting the mandibular anterior with a pontic placed in the space, extraction of periodontal compromised #24 However, an unconventional attempt to save #4 was offered to the patients as the distal of #4 can be excavated conservatively when #3 screw-retained crown was retrieved. The space between #23 and #24 and 25 and implant bridge, and cantilever Maryland bridge. Patient opted for Maryland bridge for its good esthetic and less maintenance issue. Zirconia fused Porcelain Maryland bridges were fabricated cantilevered on #23 and the pontic was placed in between #23 and #24. / /Conclusion: Her periodontitis was controlled after scaling and root planning and periodontal maintenance every 3 month. #4 was restored with Resin reinforced glass Ionomer without a pulp exposure. The Phase II treatment (cantilever Maryland bridge) was rendered successfully, and the patient was very satisfied with the esthetic and functional result.
Student(s): Aseel Karadi

Title: Case study in using implants restoration versus tooth-supported bridge in single tooth loss when the

Introduction: The purpose of this study is to compare the proposed treatment in single tooth replacement using implants versus tooth supported 3-unit bridge. / / Current Condition and Past Medical History: 61 y/o male presented with carious teeth # 3 DOB, 4DO, 10 DL, 15 MO, 18 MO and 21 MODL; missing tooth #14; root canal treated and prepared for crown restoration wit no provisional crown #12 and 13 both of those teeth has a prefabricated cast post and core. The patient presents with HTN, Osteoarthritis and Major depression disorder. / / Treatment Plan and Goals: Phase I treatment plan includes prophylaxis and OHI; periodontal diagnosis was plaque induced gingivitis. Caries control for teeth #3, 4, 10, 15, 18 and 21. For Phase II treatment plan there were two options; the first option is a single implant to replace the missing tooth #14 and two splinted crowns to restore teeth #12 and 13; the second option was to place a 4 unit bridge extending from tooth #12- 15. The second option was favored in this case. Some studies shows that it is more cost effective and economic to use single implant crown in single tooth replacement; however other factors like the condition of the adjacent teeth could alter the decision (1), like in this case. The adjacent teeth will need crowns to be restored; therefore it will be more cost effective to choose a bridge instead of single tooth implant, giving that the teeth #12 and #13 have a good prognosis. With this treatment option other issues arise for discussion, which includes the need for root canal re-treatment since these teeth have been exposed to the oral environment for more than three months with no coronal seal. In a narrative review that is done in 2011 it is suggested that if the apical seal is good there is no need to redo the root canal even if the tooth was not coronally sealed for more than 3 months; however it is better to replace the coronal restoration before putting a permanent crown (2). The post in tooth #12 is short and ideally the post should extend as long as possible especially when using a metal post as opposed to when using fiber post (3). Evaluating the need to do crown lengthening is considered due to less than ideal tooth structure is left. / / Conclusions: To maximize the cost of the proposed treatment it is prudent to ensure a favorable prognosis for the teeth supporting the bridge; thus ensuring the longevity of the
**Student(s):** Samara Al Jumaili

**Title:** Importance of Cost Effectiveness and Patient’s Medical History in Decision Making in Treatment Plan

**Introduction/Objective:** The case study is to consider the cost effectiveness and the patient’s medical history in treatment planning the patient with dental implant first line strategy vs. fixed partial denture strategy. / / **Current condition and Past Medical History:** 55 years old female AA patient presents with periodontal disease, caries teeth# 2”MO”, 12”B”, 13”DO”, Deep caries with irreversible pulpitis teeth #19 and 30. Open margin crown with recurrent caries on tooth #3. Root tips with previous RCT on teeth#10 and 11. Super eruption teeth#22 and 23. Mandibular anterior crowding. Crown with RCT on tooth #14. Missing tooth #18, and mesially tilted tooth #11. The patient wants a beautiful smile. The patient presents with Hepatitis C, fibromyalgia, arthritis, and anxiety. / / **Treatment plan and goals:** Emergency root canal treatment teeth #19 and 30. Phase I treatment plan includes four quads SRP with OHI. Periodontal diagnosis is generalized moderate chronic periodontitis. Caries control for teeth # 2, 3, 12, 13, and enamelpasty for the mandibular anterior teeth. Phase II treatment plan is either: Option I; include extracting teeth #3, 10 and 11. Crown construction for teeth #19 and 30. Implant placement on #3 and #11. Crown restoration for #3 implant, and restoring#11 with a cantilever on #10. Veneers on 6, 7, 8, and 9. Option II; extraction of teeth #3, 10, 11. Crown construction for teeth #19 and 30. 3 unite bridge teeth# 2*4. 5 unite bridge teeth# 12*8. Veneers on #6, 7. Option III; include extracting teeth #3, 10 and 11. Crown construction for teeth #19 and 30. Removable partial denture construction. Option I is favored in this case in order to have a good success rate, by saving the teeth structure as from the patient’s dental and medical history, she’s of high risk to caries. According to a study published online in 2008, as it assessed the status of oral health for the HCV patients in comparing them with general patients, they found that there is a big difference in the DMFT index between the two groups, and the number of carious and missing teeth are greater significantly in the HCV patients with a poor periodontal health. Besides that, there is another study revealed that there is coronal pulp alteration in HCV patients comparing to the general patients, as they are more prone to develop pulpitis. And from the cost point of view, a study published in 2009 revealed that Implant as the first-line strategy appears to be the ‘dominant’ strategy, considering the lower overall costs and the higher success rate in comparing the cost effectiveness of dental implant vs. bridge. / / **Conclusions:** There is always different options available in treatment planning the patient, but considerations have to be taken into account to select the best option for the patient according to different factors, such as chief complain, medical history, socioeconomic status, prognosis and patient’s preference.
**Student(s):** Tabitha Richards

**Title:** Avulsion #8 and #9

**Introduction:** Mr. M a 21 year old AA male patient. He presented to emergency clinic at SDM with CC: “I got punched in the mouth and lost a few teeth”. He does not have any dental insurance. Patient is eager for treatment to replace missing teeth.

**Current Condition and Past Medical History:** Patient reports being diagnosed with asthma, but does not use an inhaler or medication at this time. He does not recall his most recent asthma attack. Patient uses 5 cigarettes per day since 2012, uses alcohol socially consuming approximately 1-3 drinks per month, and uses marijuana daily since 2007. Patient denies any other medical problems, does not take any medications, and has no known drug allergies. Patient does not regularly visit the dentist and only seeks care for emergencies. Patient presented to emergency clinic following trauma occurring June 23, 2014. #8 and #9 were completely avulsed and the buccal plate was fractured in the areas of #8 and #9. #7 has an apical root fracture. A periapical lucency was noted on a mobile and subluxated #25. Patient presents with overbite, overjet, crossbite and labial flaring of upper laterals.

**Treatment Plan and Goals:** The goals of treatment are to treat all phase 1 treatment needs including multiple restorations, followed by orthodontic treatment and implant placed of #8 and #9. #25 was treated endodontically and splinted following trauma. The long term prognosis of #7 is guarded and possibility of the need for RCT was discussed with patient. A interim maxillary partial denture was fabricated to temporarily replace #8 and #9. Patients elects for comprehensive orthodontic treatment to treat malocclusion prior to implant placement at #8 and #9.

**Conclusions:** Multiple treatment options are available to replace missing dentition. Patient elects for orthodontic treatment and implant placement of #8 and #9. Treatment is currently in progress.
**Student(s):** Jonathan Vo  

**Title:** Root Resection Therapies: Mandibular molar hemisection and a maxillary molar palatal root resection  

**Introduction:** Root resection therapies can be viable treatment options when there is furcation involvement. This poster will highlight two separate cases involving a mandibular molar hemisection (#30) and a maxillary molar palatal root resection (#14).  

**Current Condition and Past Medical History:** Root resection therapies were performed on ASA I patients with no active medical problems, are not taking any medications, and has no known drug allergies. The mandibular molar hemisection was performed on #30 on a 52 y/o caucasian male, and was the only remaining tooth on the left side. In efforts to create a well fitting removable prosthesis, it was crucial to save this tooth. The distal root was exposed with grade II furcation involvement, and grade I mobility. The maxillary molar palatal root resection was performed on #14 on a 30 year old middle eastern male patient. The patient was adamant about not losing the tooth. The tooth had grade 0 mobility and no furcation involvement. However, there was a history of pulpotomy during childhood, large complex pin retained amalgam restoration, and large palatal root perforation extending from the lingual to the mesial.  

**Treatment Plan and Goals:** In both cases, it was crucial to save these particular teeth. While the prognosis is still guarded for both teeth, root resection therapies were opted for to buy additional time before more traditional options of implants can be considered. The distal root of #30 was resected, endodontic therapy was completed, and the mesial root was premolarized as a survey crown for a removal partial denture. There is no current mobility on this tooth. Endodontic therapy on #14 was completed, and two pins were placed into the buccal roots anchoring a core build up. The palatal root resection was completed and bone graft was placed to preserve bone. Today, mobility has stabilized to grade ~0.5-1. A final restoration has not been delivered at this time.  

**Conclusions:** Root resection therapies to save teeth is often an overlooked option in treatment planning. While these two case studies presented are in their infancy, the prognosis of these two teeth are favorable, and should be able to provide additional years before having to resort to implant therapies. Careful treatment planning and site management are key to the success of root resection therapies, and can be a viable option in many cases where a tooth would need to be saved.
Community Oral Health Honors Program
Abstracts

Penn Dental Medicine
Student(s): Nicholas Saggese and Silke Cummings

Title: Oropharyngeal Cancer Awareness in West Philadelphia

Community Site: SAYRE Health Center, 5800 Walnut Street Philadelphia, PA 19143

Faculty Advisor(s): Dr. Joan Gluch (Director of Community Oral Health, Penn Dental)

Community Preceptor(s): Dr. Joan Gluch (Director of Community Oral Health, Penn Dental)

Site Description: We will be working at the SAYRE Health Center in West Philadelphia. It is a community health center based at the local high school, and the patient base encompasses local residents, many of whom have a lower socio-economic status. / / Program Description: SAYRE’s goal is to provide health promotion, disease prevention, and primary care to all members of the community, especially those who are underserved. In keeping with this, our program will continue this vision within the scope of oropharyngeal cancer awareness. Using social/clinical research we will create a database that will be used to improve oropharyngeal cancer awareness and care, both for the patient and the practitioner. / / Objectives: Our goal is to assess and increase oropharyngeal cancer awareness among patients at the SAYRE Health Center in West Philadelphia. Through analysis of the surveys we will be able to measure differences in understanding in sub-populations of our patient base to allow for future educational endeavors. / / Activities and Evaluation: We have developed a survey based on the prior “Developing an Oropharyngeal Cancer (OPC) Knowledge and Behaviors Survey” by Dodd et. al. at the University of Florida. Their research concluded that the method used was culturally significant and the instrument was acceptable in terms of the level of reliability. We will be using iPad software to distribute the surveys at the site, and one of us will be on hand at all times to ensure thing run smoothly. Information will be downloaded to our database, and from here we will be statistically analyzing metrics specific to particular patient sub-groups. / / Lessons Learned and Program Outcomes: From our project, we expect to gain a better understanding of our patients’ baseline knowledge of oropharyngeal cancer, so that we can better provide outreach to, and treatment of, these patients. We expect that our research will contribute to the implementation of a school-wide practice.
Student(s): Eliza Callwood

Title: School District of Philadelphia Oral Health Academy at Penn Dental Medicine

Community Site: PDM and A. Philip Randolph Career and Technical High School

Faculty Advisor(s): Dr. Beverly Crawford

Community Preceptor(s): Ms. Charlene Fenster

Site Description: The School District of Philadelphia Oral Health Academy (OHA) at Penn Dental Medicine complements the dental assisting program taught by Ms. Charlene Fenster at the A. Philip Randolph Career and Technical High School (CTHS). The program takes place at the CTHS laboratory and Penn Dental Medicine.

Objectives: The OHA provides the opportunity for qualified junior and senior high school students to gain hands-on experience and exposure to higher education in the oral healthcare profession through mentorship, laboratory courses and shadowing experiences.

Program Description: Students attend the OHA one afternoon a week for a ten-week period. Students participate in presentations from dental students and faculty on a variety of topics including SAT preparation, writing a personal statement and college essay, and financing education. Senior students complete a radiology course provided by Dr. Muralidhar Mupparapu, Professor of Oral Medicine and director of the Division of Oral & Maxillofacial Radiology. In this course, students learn general concepts and techniques in radiology and complete rotations in the Radiology clinic to practice radiographic technique and observe dental students. Junior students complete a laboratory course that includes alginate impressions, pouring gypsum models, fabricating custom trays and a provisional crown. Students complete a laboratory session at CTHS provided by dental students. Senior students assist dental students in completing a class II amalgam, class III composite, and an anterior crown preparation. Seniors then complete a provisional crown with assistance from a dental student. Junior and sophomore students observe all activities.

Activities and Evaluation: Students are given written exams and quizzes to evaluate their progress in the Radiology course. At the completion of the course, students take the Dental Assisting National Board Radiation Health and Safety Exam. Student laboratory work is assessed using competency evaluations assessed by volunteer dental students and Dr. Beverly Crawford. College application, admission and enrollment of all senior students are tracked.

Lessons learned and program outcomes: The OHA is important in expanding these students' awareness of what is available to them by continuing their education. Over the past two years I have seen a number of them inspired, interested, and excited in pursuing a career in dentistry and other medical professions. I have also seen them learn how to conduct themselves in a professional environment and emulate the work ethic that is demonstrated by their mentors. The OHA also provides the opportunity for dental students to teach, mentor and support local high school students.
**Student(s):** Elite Mekel, Mark Guevarra, Marie Kim, MaryJane Anderson, and Amy Sakowitz

**Title:** The Homeless Health Initiative

**Community Site:** The Homeless Health Initiative: St. Barnabas’ Mission (6006 W Girard Ave), Jane Addams’ Place (25 S 43rd St), and People’s Emergency Center (325 N 39th St)

**Faculty Advisor(s):** Dr. Joan Gluch

**Community Preceptor(s):** Melissa Johnson, Homeless Health Initiative Social Work Trainer

**Site Description:** HHI is a community outreach program that serves three emergency shelters in West Philadelphia. Volunteer teams from medicine, dentistry, social work and nursing work hard to bring health services to West Philadelphia’s homeless population. / / **Program Description:** Since 1988, HHI has aimed to serve West Philadelphia to provide preventive health care. Each family will rotate between the various health specialties to ensure that children have been up-to-date with their check-ups. / / **Objectives:** It is our goal to assist mothers in finding a dental home to help reinforce the importance of regular visits to the dentist. Fostering a strong relationship between mothers, children, and their dental provider will hopefully ensure a consistent routine for every family member’s oral care. Although we spend a lot of time completing oral health exams on the children, it is just as critical to educate the children and their guardians about the importance of good oral hygiene. / / **Activities and Evaluation:** At Each CHOP dental night, the head social worker provided our team with a logistical run down of the number of children expected and areas to focus in on. Families would begin by checking in with their social worker, and then head over to the physician and nurse for overall health assessments. Their last rotation would be with the dental team, who consisted of one pediatric resident, and multiple dental students. The dental team took turns screening patients, providing fluoride, and educating the children. Our pediatric resident would review our clinical findings, and helped with recommendations to the guardian regarding the child’s dental care. We were sure to ask when the child would be seeing a dentist next for further evaluation, so that we could help facilitate the family establishing a consistent dental home / / **Lessons Learned and Program Outcomes:** Our experience with HHI has been very rewarding regarding the impactful role dentistry plays in public health care. HHI provided us with an opportunity to delve into an even more specific niche of homeless mothers and children living in transitional housing. Caries risk and rates in this population was extreme according to the CAMBRA risk assessment. One common pattern we encountered was baby-bottle syndrome. The mothers informed us that at night in group housing, they often had no other choice but soothe their crying child with a bottle. Homeless mothers face challenges not seen in other populations and it is imperative that programs, such as HHI, expand to more areas in the future. This has been as tremendous learning experience for all of us, and we hope to continue giving back in similar capacities in the future as it will be our immediate goal to help foster the same level of care and passion for dental public health. We are grateful to HHI, CHOP, and The University of Pennsylvania for this once-in-a-lifetime opportunity to integrate ourselves into the West Philadelphia community.
Student(s): Blaire Stoveld

Title: Marketing for Oral Health Awareness

Community Site: St. Christophers Children's Hospital 160 E Erie Ave, Philadelphia PA 19134 & Penn Dental 240 40th Street Philadelphia Pa 19104

Faculty Advisor(s): Dr Joan Gluch, U Penn

Community Preceptor(s): Judy Gelanis, St Christopher's, Dr. Joan Gluch, U Penn

Site and Program Description: I marketed on behalf of the Oral Health Care Initiative through St. Christophers Children's Hospital. They operate the Ronald McDonald Care Mobile, a "dental home" for children of the local Philadelphia community, 1-13 years of age. Their goal is to provide children with consistent 24/7 dental care, of any magnitude, at zero cost, either on location, or at the hospital. I also used some of my experiences to help Penn Dental's SmileBus, an education and care providing bus, promoting oral health care to the children of the community. // Objectives: The goal of my work on behalf of the Care Mobile, was to raise community awareness of the program as well as increase patient retention upon initial visits, through marketing. // Activities and Evaluation: The activities I took part in, included working with St. Christopher's marketing team to create new distribution flyers. I also researched local camps, day cares, churches, and not for profit programs, in order to provide a local contact list for raising awareness. I vocally campaigned for the Care Mobile, as well as provided these locations with emailed flyers and fact sheets to print out and post around their communities. I created a "how did you hear from us" form, for patients to fill out upon registering with the care mobile, in order to determine the best marketing channel to pursue for the program. For Penn Dental, my goal was to help the SmileBus retain more evaluation forms, in order for more children to be seen. A few of my ideas include working with a company such as Colgate to provide a "dental care package" for the family upon form return. Another idea is to provide a dental care "coupon" for family members returning the form, allowing them a slight discount on certain procedures at Penn Dental. A third idea is to create a "cost analysis" sheet, to be sent home as part of the form, bringing light to the costs of neglecting a child's dental care (financially, physically, as well as emotionally). I will also be working with Penn Dental to create a more practically sized screening form for patients to take home upon being seen. The goal is that this form enables them to more adequately follow up on their home oral hygiene as well as their routine visits. I have, and will be reaching each of these goals through a marketing lens, in hopes to not only benefit the the programs I have worked with in the immediate present, but to provide them with ways to sustain reasonable methods of reaching out to their local communities. // Lessons Learned and Program Outcomes: Through my work with St. Christopher's, I was able to reach a broad spectrum of community members, and I feel as if I truly made a difference through this broad reach. The Care Mobiles fact sheet and flyers are currently distributed to as many local community programs as possible, and that the mobile is
currently booked through Summer. As I will be doing my Penn work over the next few weeks I will update with lessons learned.
Student(s): Jaskaran Saggu and David Wong

Title: OPC Awareness in Patient Seeking Care at Sayre Health Center

Community Site: Sayre Health Center; 5800 Walnut St, Philadelphia, PA 19139

Faculty Advisor(s): Dr. Joan Gluch, COH

Community Preceptor(s): Deanne Wallaert, COH

Site and Program Description: Each year, more than 30,000 new cases of Oral and Oropharyngeal Cancer (OPC) are diagnosed and account for over 8,000 deaths. Despite efforts by organizations like the Oral Cancer Foundation, Mouth Cancer Foundation or Fight Oral Cancers, OPC continue to represent 3% of all new cancers in the United States. OPC is typically diagnosed at the median age of 62 years (National Institute of Cancer). The 5-year survival rate is approximately 58% (whites) and 31% (blacks). Late detection of cancer is one reason for the low 5-year survival rate; in fact the median age at death is 67 years. / / Objectives: Lack of public awareness remains a fundamental problem in early oral cancer diagnosis. Often times oral screening programs do not target groups that are most susceptible. Raising public awareness in susceptible groups efficaciously remains a challenge in many public health interventions. The aim of this study is to administer a socially appropriate survey to assess the overall awareness level of patients seeking care at Sayre Health Center. We plan on administering a survey to at least 100 adult patients residing in West Philadelphia to assess the local communities’ awareness levels. / / Activities and Evaluation: Dr. Dodd and colleagues at University of Florida, College of Dentistry have developed a well-researched survey for testing OPC knowledge and awareness. After receiving approval from the University of Pennsylvania’s Institutional Review Board, we will administer a modified electronic survey to patients seen at Sayre Health Clinic to understand the existing levels of OPC Awareness. The survey consists of 17 items in the following sections: patient demographics (4 questions), history of an knowledge or having had an OPC screening exam (3 questions), identifying OPC risk factors (5 questions), and knowledge of signs and symptoms (3 questions). The survey will be administered to patient seeking care from June – August 2015 on the Quick Tap Pro Software through the COH Department Ipads. / / Lessons Learned and Program Outcomes: Using the results of the administered survey, we will understand if high- high-risk individuals for oral cancer in the Sayre Health Clinic are informed about their predisposition. This information will be useful in developing educational endeavors that target high-risk individuals for OPC to get tested earlier. Following the administration of the survey, patients will be given pamphlets regarding OPC awareness as part increasing overall OPC awareness in the community. The study is currently pending IRB approval. So far this study has given us a great insight receiving IRB approval.
Student(s): Jee Hye Choi, Abedin Dadehbeigi, and Priya Agrawal

Title: Increasing Oral Hygiene Awareness in University City

Community Site: University City Hospitality Coalition: Saint Agatha/Saint James Church 38th and Chestnut

Faculty Advisor(s): Dr. Joan Gluch

Community Preceptor(s): Ms. Ellen Witsch

Site and Program Description: UCHC is a community site that works with the poor and homeless in the University City area by providing a hot meal, referrals for shelter, as well a medical, dental, and legal clinic. Clothing and toiletries are provided when supplies are available.

Objectives: The objective of this project was the increase oral hygiene awareness in the community and provide the tools and education to improve oral health.

Activities and Evaluation: Initially dental supplies were handed out along with the offer of providing oral hygiene instructions. Many declined the latter offer saying that they already knew how to brush their teeth. The incentive of providing mouth wash was given for those who received intra-oral examinations. This incentive increased the number of participants who were examined; this was beneficial because individuals' oral health could be evaluated and recommendations on the urgency of need of treatment relayed. Access to care was an issue, so individuals were offered a list of dental clinics in the surrounding communities along with a flyer for the Community College of Philadelphia which provided free dental cleanings and Xrays. Individuals who came due to dental pain were quickly examined and given referrals to a local dentist who was working with UCHC to provide urgent dental care through the use of funds provided by UCHC. The medical clinic was often consulted for the administration of antibiotics for tooth infections causing extreme pain. In order to increase oral hygiene awareness and the opportunity to provide oral hygiene instructions, the Oral Health Educational Program was initiated. Participants were offered a spin brush if they participated in an oral exam along with oral hygiene education. They returned on a weekly basis for follow up visits to note improvements as well as to receive extra supplies in the form of mouth washes. Participants came back either on a weekly or biweekly basis and were more likely to talk to us about their dental concerns.

Lessons Learned and Program Outcomes: Through this experience we were able to raise awareness and improve oral hygiene. Working at UCHC has made the poor access to care to the homeless in our community more transparent.
Student(s): Katherine France, Zesheng Chen, Katherine Schier, Meeta Chawla, and Kari Hexem

Title: Philadelphia FIGHT Dental Services

Community Site: Philadelphia FIGHT, 1233 Locust St. Philadelphia, PA

Faculty Advisor(s): Joan Gluch, Penn Dental Medicine

Community Preceptor(s): Ellen Witsch, Penn Dental Medicine

Site Description: From its website, Philadelphia FIGHT is “a comprehensive health services organization providing primary care, consumer education, research, and advocacy for people living with HIV/AIDS and those at high risk.” The patient population is mostly of lower socioeconomic status, is diverse in terms of age and race, and mainly comes from the Greater Philadelphia region. /\ Program description: The Honors Program at Philadelphia FIGHT ("FIGHT"), launched during the 2013-2014 academic year, is a collaborative endeavor between students from Penn Dental Medicine and the Jonathan Lax Treatment Center within the FIGHT building in Center City, Philadelphia. It is a once-weekly dental screening, education, and referral program for patients at FIGHT that is run by three Penn Dental senior students, two junior students, and one public health hygienist supervisor. /\ Objectives: The Program aims to improve the oral health of community members living with HIV/AIDS and those at risk of acquiring HIV. /\ Activities and Evaluation: Patients are visually screened for dental issues, periodontal and TMJ problems, as well as oral cancer lesions. Patients are educated on their active problems as well as proper oral hygiene and use of dental products. Based on a number of factors, students refer patients to clinic(s) that are most appropriate for them. Students also have the unique opportunity to shadow FIGHT physicians to better understand how oral health is related to overall health in our patient population. Whenever possible, students track patient progress to see if they received care. Some patients were hard to reach, but those referred to Penn were easier to track due to internal access. Students assess how the program is going in their personal monthly Honors Log and based on patient tracking results and appointments scheduled. /\ Lessons Learned and Program Outcomes: Fewer screening appointments were being scheduled starting in early 2015. To spread awareness for the dental program, students began advertising the program in waiting rooms. Appointment numbers increased after this. An unexpected occurrence this year was that some patients were told that the screening program offered a full range of active dental services. Although an internal FIGHT dental clinic is in development, these plans seem to have been conveyed to some patients prematurely. Patient communication and expectation management became key in these cases. The Honors project at FIGHT has been a fantastic opportunity to work with marginalized populations that have many unmet dental needs. Students have gained invaluable insight on managing patients in an interdisciplinary health care setting.
Student(s): Krushan Patel, Joel Ayon, Raul Davila, and Jordan Katyal

Title: PUENTES DE SALUD

Community Site: PUENTES DE SALUD

Faculty Advisor(s): Dr. Joan Gluch

Community Preceptor(s): Mary Cummings

Site Description: Puentes de Salud's mission was to provide high-quality healthcare to the rapidly growing Latino community in Philadelphia while also providing future generations of health care advocates and providers with the opportunity to learn how to properly engage with the local Hispanic community. The comprehensive care team at Puentes de Salud included, but was not limited to, primary care health care personnel, medical specialists, and dental healthcare providers. However, as the mission statement depicts, the volunteers understood that this ability to provide high quality care will not last for long unless the torch is passed on to the next generation of professionals who are willing to keep engaging in the community.

Program Description: Our primary objective as representatives of the dental component at Puentes de Salud was to provide dental care and education to children and parents. This was met in a three faceted approach including oral health education nights, oral screening and sealant nights, and through the use of the Penn-Smiles bus.

Objectives: Our project goal was to gain an understanding of the various social, economic and educative factors faced by the Hispanic community in Philadelphia concerning their oral health. We provided information geared towards this community with the intention of improving upon the oral health status of the population.

Activities and Evaluation: During education nights we provided information about at home dental care for children as well as the dates for our oral screenings. Every other Wednesday parents had the opportunity to bring their children to Puentes de Salud to get oral screenings, prophylactic treatment and dental sealants free of charge. Upon detection of clinical caries we further instructed them about our Penn-Smiles bus where they had radiographs taken and received restorative treatment. Health promotion presentations were given at the Mexican Consulate to supplement our involvement within the Hispanic community. Poster presentations were used with an emphasis on preventive oral hygiene and early intervention in pediatric dentistry. We informed the people at our presentations of the services we provided at Puentes de Salud and that it was available to them if they were interested. Effectiveness of our project was measured in two ways, the first was a qualitative measure of patient oral status through recall visits. The second, a more quantitative approach based on patient numbers we obtained during the course of our project.

Lessons Learned and Program Outcomes: Our honors project taught us several things and we developed new skills that will help us in our careers. We all improved with our ability to evaluate and effectively treat pediatric patients. We have also come to learn of many ways in which to treat patients who do not primary speak English. Tools such as translation and demonstrations prior to delivering the required treatment modalities were used.
Finally, we gained vital knowledge on patient management and scheduling during the course of our great experience.
Student(s): Henry Ma, Travis Williams, and Andrew Fraser

Title: Vietnamese United for Health Community Honors Project

Community Site: Greater Philadelphia

Faculty Advisor(s): Dr. Nhat-Khai Do, Alumni

Community Preceptor(s): Dr. Joan Gluch

Site Description: The Vietnamese Community Honors project was designed to serve the Greater Vietnamese population of Philadelphia and the surrounding suburbs. While settings of each event differed from church gatherings to community fairs, the ultimate goal was to provide oral cancer screenings and dental awareness. // Program Description: We noticed the remnants of a recent Penn Dental fair in the area and wondered what was being done on a regular basis for this community. There was currently no Vietnamese student group at UPenn so we sought the guidance of people in the community who could better help us understand the needs of the Vietnamese population. We were lucky to meet Dr. Nhat-Kai Do who was, herself, trying to organize a regular team of dentists from our school to assist her and the Vietnamese United for Health Organization provide oral health and hygiene counseling to the community. Dr Do is a graduate of UPenn School of Dental and understands the values of our program and our community health programs. // Objectives: At each fair organized by the VUH and through our program, we have set up booths to provide oral health care screenings (provided to both adults and children with the consent of their parents), nutritional and dietary education for all ages, and advice and guidance on proper oral health care management. In addition, we acquired the funding and supplies necessary to provide dental goodie bags with toothbrushes, floss, and tooth paste to demonstrate proper dental techniques and encourage implementation of techniques learned from the dental students as well as a plethora of dental educational pamphlets (in both Vietnamese and English) for the visitors. // Activities and Evaluation: For the children, our team assembled children’s activity booths to provide awareness of how to maintain proper oral hygiene, proper flossing techniques, dietary evaluations, mouthwash counseling, and oral screenings upon consent from parents. These activities were completed through various games and coloring activities to make the information more palatable to the children. // Lessons Learned and Program Outcomes: In the end, our team developed a much greater appreciation for working with underserved populations and the cultural nuances associated with dentistry in the Vietnamese community. Working alongside Dr. Do has taught as an invaluable lesson in patient communication and management. We hope that the connection we have established between the Vietnamese United for Health Care Organization and Penn Dental will continue to serve the Vietnamese population of Philadelphia in times to come.
**Student(s):** Andrea Aduna, Eunice Chay, Atoosa Pahlavani, Matt Oishi, Jordan Seetner, Jessica Koby, Jenny Kim, Abedin Dadehbeigi, David Wong, Jaskaran Saggu, and Akanksha Gaur

**Title:** Penn Dental Medicine at Sayre Health Center

**Community Site:** Penn Dental Medicine at Sayre Health Center, 5800 Walnut St., Philadelphia, PA, 19139

**Faculty Advisor(s):** Dr. Joan Gluch, PhD, RDH

**Community Preceptor(s):** Dr. Gregg Rothstein DMD, Shabnam Sedaghat DMD, and Ms. Deanne Wallaert, RDH

**Site Description:** Sayre Health Center is a community health facility that serves the residents of West Philadelphia. In addition to comprehensive medical services, Sayre Health Center provides extensive dental care. Services offered to patients include simple restorative care, periodontal treatment, crown and bridge, as well as dentures. The Sayre dental team is comprised of part-time general dentists, one full-time public health dental hygiene practitioner and third and fourth year dental students.  

**Program Description:** The Community Oral Health Honors program at Sayre Health Center is unique in that it’s composed of both a preventative and a clinical component. Third year students have the opportunity to make strides in the community by bringing dental health awareness and education to health fairs. Additionally, periodontal care, screenings and radiographs are provided to West Philadelphia residents during weekly evening clinical sessions. Fourth year students have the privilege of working alongside a general dentist to provide comprehensive dental care throughout the week.  

**Objectives:** Through the services offered at Sayre Health Center, five major objectives were met: 1. To provide comprehensive dental care in a community based setting under the guidance of practicing dentists. 2. To further strengthen clinical skills. 3. To develop an understanding of practice management within the public health arena. 4. To work collaboratively with physicians and nurses as part of a cohesive healthcare system. 5. To provide oral hygiene education and preventative dental care under the supervision of a practicing hygienist while emphasizing the importance of oral health and its connection to systemic health. This program is evaluated by personal assessment of the Third and Fourth year participants and by Dr. Rothstein, Dr. Sedaghat and Ms. Wallaert.  

**Lessons Learned:** Throughout the academic year, the honors students were able to coordinate community health fairs and provided comprehensive dental care to numerous residents of West Philadelphia every week. Sayre Health Center gave students the invaluable opportunity to enhance their clinical skills in a setting comparable to private practice.
Student(s): Yesle Kim

Title: Growing Penn SDM presence at Philadelphia Ronald McDonald House

Community Site: Philadelphia Ronald McDonald House, 3925 Chestnut St, Philadelphia, PA 19104

Faculty Advisor(s): Joan Gluch, Director of Community Oral Health

Community Preceptor(s): Linda Parry, Director of Volunteers

Site Description: The Ronald McDonald House serves as a temporary home for families that are away from home. Located only two blocks away from Penn SDM, the Philadelphia Ronald McDonald House is the first of over 300 Houses around the world. The idea to establish a temporary home for families with ill children came from Dr. Audrey Evans, a pediatric oncologist at CHOP who is a familiar face at Ronald McDonald House gatherings. The first House opened its doors in 1974 on Spruce, just blocks away from its current location.

Program Description: The goal of my COH project was to bring Ronald McDonald House onto Penn dental’s radar. I wanted to do this two-fold: first by increasing visibility and involvement of Penn dental students at the Ronald McDonald House. Objectives: Ronald McDonald House is an organization with many needs. Given my familiarity with the House I wanted to serve as a liaison between the organizations at Penn SDM and Philadelphia Ronald McDonald House. A side goal was to encourage other dental students to become regular volunteers at the House. From my own experience, I have become a much better communicator with greater confidence and ease discussing sensitive information. Second, I wanted to recruit patients for our Penn SDM clinic from the House. Many families have extended stays at the House- 32 families stayed for longer than 30 days in 2013 with the longest family staying for an entire year. These guests are also unfamiliar with the immediate surrounding Philly area since they must live at least 25 miles away from the House to qualify as its temporary resident.

Activities and Evaluation: Wrapping up this academic year, I have volunteered over 90 hours at the House. This year I also filled in for emergency shifts when regular volunteers were stranded in snow. I also became trained as a shuttle driver to transport families to and from CHOP as part of PRMH’s regular services. Penn dental has increased its involvement at the House by hosting Penn Palate dinners, and spring-cleaning the House in our second annual Day of Service. AO also has an ongoing tab collection for the House. However, I have come into some hardship regarding dental care. In discussing families’ dental needs with our Director of Volunteers Linda Parry, I was disappointed to find that families often did not have time nor desire for dental care. We made handouts about local dental clinics but did not have any success recruiting family members for Penn SDM.

Lessons Learned and Program Outcomes: I learned that families have limited free time in during their hospital stay: they spend their entire days at the hospital with their sick child or are busy entertaining the sick child’s sibling who is often taken out of school for duration of treatment. I plan on continuing with my commitment next year and beyond. Despite a slight change in my volunteer focus at the PRMH, this
organization has helped me grow. Meeting like-minded individuals who care about the community has inspired to keep giving. Even if my service is not immediately dentistry-related, I can contribute to the community- all the while polishing my interpersonal skills. I am also hoping to see continued further involvement with PRMH at Penn.
Student(s): Daniel D. Lee, Seeun Mok, Vivian Hwangbo, Cindy Lee, and Jinah Kang

Project Title: Emmanuel Church Dental Community (ECDC)

Community Site: Emmanuel Church in Philadelphia, 4723-41 Spruce street, Philadelphia, PA 19139

Faculty Advisor(s): Doctor Jessica Kim

Community Preceptor(s): Pastor Jikwang Kim

Site Description: Our community oral health project serves the local Korean populations in West Philadelphia, as well as the greater Philadelphia area. We primarily focus on preventive oral health and hygiene education projects on children of age 5-15. We also provide dental and periodontal education and oral cancer screening on senior populations of age 50 and above. //

Program description: Oral health has been a growing concern in the U.S., particularly pertaining to the older generation, children and the population with systemic diseases. The majority of senior Korean population is unable to speak English fluently, and have difficulty communicating their dental needs in the United States; therefore, this population is neglected from the mainstream dental care and often do not receive the dental care they need. //

Objectives: In this COH project, we targeted the local Korean population in West Philadelphia to educate on how to maintain good oral hygiene, as well as raise awareness on the importance of oral health. We worked with the local Korean church, the Emmanuel Church, and gradually expanded to include the neighboring Korean communities around Philadelphia. //

Activities and Evaluation: Our project consists of two major activities: education and screening. For screening, dental student volunteers mainly screened patients for head and neck cancer as well as other general oral lesions such as caries, gingivitis, and periodontitis. For patients with any dental needs, we made recommendations to visit UPSDM clinic or other dental offices in the nearby community, including free cleaning sites available in Philadelphia. As part of education activities, we provided oral health education classes for the elderly and the children with topics including guidance for general oral health maintenance, nutritional counseling, and recommendations for selecting appropriate oral care products according to their oral health status. Lastly, we also distributed dental products such as toothbrush, toothpaste, and floss to the participants. ECDC being a relatively new project, we made and distributed evaluation surveys for the volunteers to give us feedback to help us improve our project. We received feedback from the site supervisors and staff to monitor the progress of our project over the year. Through the surveys, we were able to gather important information such as other topics they wished us to include in the presentations. Through such evaluation, we were able to incorporate helpful suggestions to our next activity, improving education and awareness overall. //

Lessons learned and program outcomes: We were able to promote better oral hygiene instructions and serve the Korean population in the Philadelphia area as a whole. We gave basic dental recommendations and informed them of affordable care at UPSDM for further treatment. We learned that we can make an impact on our local community through education and simple dental screenings.
Student(s): Breanna Donald and Ashley Abraham

Title: Guatemala Health Initiative: Oral Health as a Component of Global Health

Community Site: Hospitalito, Santiago Atitlán, Guatemala

Faculty Advisor(s): Dr. Joan Gluch, Associate Dean for Academic Policies; Interim Division Chief, Community Oral Health

Community Preceptor(s): Dr. Kent Bream, Director of Guatemala Health Initiative; Perelman School of Medicine, Dept. of Family Medicine and Community Health

Site Description: The Guatemala Health Initiative (GHI) was established in 2005 by a collaborative partnership between Penn Medicine and Penn Nursing. Broadly, the goals of the project are to enhance the health status of the impoverished communities located in the medically underserved highlands of Guatemala, specifically in the Tz’tujil Maya village of Santiago Atitlán. The hub of much of the collaborative care is the ‘Hospitalito,’ or little hospital. Aside from existing research on nutritional inadequacies and consequences on health, there is little knowledge on the oral health status of this population.

Program Description: In an effort to assess the potential of expanding the GHI mission to include preventive and interventional dental care, three third year students designed a needs assessment in the form of semi-structured interview questions for key-informants stationed in Santiago Atitlán. Objectives: The goals of these interview questions were to: assess perceived need for improvement in oral health in the population, gather information on perception of dental and oral health and current hygiene practices, and understand barriers to care.

Activities and Evaluation: During the period of March 9th through March 13th, two members of the team conducted these semi-structured interviews. Multiple interviews were conducted with individuals from all tiers of the health front: a hospital dentist, a técnico (dental technician), American-trained dentists, a dental assistant, and an executive director of a local health clinic. All interviews were either video or audio-recorded. Most of the interviews were conducted in Spanish. The needs assessment also involved assessing potential for community partners including surrounding schools and grassroots initiatives. Generally speaking, the interviews highlighted a strong need for an oral health educational initiative targeting women and children. The oral health status in this community was described as very poor, with high rates of decay and premature tooth loss. It was suggested that an oral health initiative would only be efficacious through targeting women and providing logical, economically sensitive, and sustainable solutions that would appeal to their responsibility as a caregiver.

Lessons Learned and Program Outcomes: This needs assessment brought to light the delicacy required in ensuring narrative justice through the filming and audio-recording of all interactions. Careful consideration was given to what and when to record information, ensuring that informed consent was given for all semi-structured interviews. Beyond this, understanding health in the context of multiple intersecting parameters, including lack of clean drinking water and electricity, adds further challenges to developing a culturally sensitive, meaningful, and sustainable initiative in this community. Future directions include
development of multi-media educational materials, training of bi-lingual (Spanish/ Tz’ujil) community health leaders, and collaboration with existing dental mission groups in delivery of care.
Student(s): Leiza Walia, Riddhi Desai, and Laura Koo Min Chee

Title: Collaboration Enhances Care at United Community Clinics

Community Site: United Community Clinics: First African Presbyterian Church 4159 Girard Avenue Philadelphia, PA 19104

Faculty Advisor(s): Joan Gluch, RDH, PhD

Community Preceptor(s): Community Preceptor: Eric Goren, MD

Site Description: United Community Clinics (UCC) is a free, student-run clinic offering free healthcare screenings and social services to the community in West Philadelphia. Students from the University of Pennsylvania Medical, Dental, Nursing, Social Policy and Practice, and Undergraduate schools volunteer every Monday night, when the clinic operates from 6:00-9:00 p.m. These patients are often seeking basic physical exams for employment opportunities, driver’s licenses or school physicals; thus the service UCC provides is an invaluable one to the community. // Program Description and Objectives: UCC’s objective is to improve the health of our patients through an interdisciplinary approach. Increasingly medically complex patients usually require the collaboration of more than one medical profession for appropriate diagnosis and treatment. Any effective teamwork among the professions requires, among other things, basic awareness of each one’s influence in medicine. By working with other disciplines of the health care system we emphasize the importance of dental care in the deliverance of comprehensive health care. UCC serves approximately 530 members of under and uninsured population annually. // Activities and Evaluation: Patients first have their vitals taken and are screened for hypertension. Then, social work assesses the patient’s needs for any counseling services and referrals for areas such as housing, childcare, employment, and substance abuse treatment. Patients’ medical histories are then reviewed, and are given physical examinations by the medical and nursing students. Optometry offers eye examinations. Finally, dental students provide a general intra/extra oral evaluation, oral cancer screening, hygiene instruction, and a referral to local clinics. The evaluation of our services at UCC is guided by the department of Community Oral Health’s Standardized Screening Form. This form standardizes our initial data collection by guiding us through an efficient and thorough set of questions as we assess the oral health of our patients. This form can later be used to better understand the needs of our patients, all in an effort to better direct and cater to their problems. Additionally in order to ensure that our oral hygiene instructions are not forgotten, we have initiated an oral hygiene instruction program. Each patient now takes home a reminder sheet with the basic oral hygiene techniques required to maintain the health of their mouth along with a toothpaste, toothbrush and floss. // Lessons Learned and Program Outcomes: One of the most valuable lessons learned was that one provider’s area of health expertise does not meet all of the needs of any given patient. While understanding our unique role in the healthcare system, we value the importance and interplay of all disciplines. Together, the students are helping each other better understand and appreciate the roles and contributions that each discipline contributes to the care delivery experience.
Student(s): Dayoung Jessica Song, Ji Lim, and Leah Yi

Title: From mother to child - a dental health initiative at Alpha Pregnancy Services

Community Site: Alpha Pregnancy Services, 1601 Lombard St, Philadelphia, PA 19146

Faculty Advisor(s): Dr. Joan Gluch, Penn Dental Medicine

Community Preceptor(s): Dr. Joan Gluch, Penn Dental Medicine, Ms. Mary Frances Cummings, Penn Dental Medicine

Site Description: Alpha Pregnancy Services (APS) is an outreach organization that offers help and hope to women and families facing pregnancy and related concerns. APS is a faith-based organization that aims to empower women who are facing difficult life-challenges related to pregnancy and offers them compassionate alternatives to abortion through providing various social services, medical referrals, and education. / /Program Description: Our main purpose in partnering with APS is to increase awareness of the importance of dental health and increase access to care specifically to pregnant women in the Philadelphia community. / /Objectives: Our focus is on oral health education and oral disease prevention by targeting pregnant women and helping them to develop proper oral health practices for not only for themselves but also for their infants. In order to integrate a dental and oral health education component to the APS care system, we made presentations for classroom-based lecture series and offered one-on-one private discussions focusing on patient education using evidence-based information. / /Activities and Evaluation: Before engaging in personal discussions about their health, we learned that it was important to establish primary psychosocial rapport first with the clients of APS. Therefore, we had the chance to learn about each individual’s needs, concerns, resources, habits, and health so that each client’s educational materials were catered specifically to their needs. Topics include explaining the relationship between pregnancy and periodontal health, infant and child oral care, and detailed oral hygiene instructions using visual models. Evaluation of the increase in access to care and patients’ development of awareness to their oral health were conducted through follow-ups with the registered nurses and social workers at the site. / /Lessons Learned and Program Outcomes: Penn Dental’s involvement at the site was influential to the clients of APS. Many of the clients have expressed how they now better understand of the importance of oral health for themselves and their baby and are currently actively seeking professional dental care. The program outcome for students involved in this project includes learning to utilize interpersonal and communication skills to address oral health concerns in the community and gaining greater multicultural awareness of populations outside a dental school setting. Furthermore, through interacting with more vulnerable clients of APS, students are learning how to make genuine attempts at understanding the emotions of different individuals. The skills learned through this program play a critical role in helping the students gain sympathy and to succeed in providing more quality dental care in the future.
Student(s): Allison Hensler

Title: Healthy Mouths for LIFE

Community Site: LIFE- Living Independently for Elders; 4508 Chestnut Street Philadelphia, PA 19139

Faculty Advisor(s): Joan Gluch, University of Pennsylvania

Community Preceptor(s): Ingrid Sidorov, LIFE

Site Description: Living Independently for Elders (LIFE) is a facility located at 4508 Chestnut Street that provides preventive, primary, acute, and long term health care services and allows older adults to continue living in their homes as long as possible. Program description and Objectives: Today the population of individuals 65 years and older is rapidly growing, and many older adults are retaining their teeth. The ability of a dentist to manage the unique oral health needs of a geriatric patient is an essential skill. The oral health of older patients is directly connected to conditions common in this population such as polypharmacy, diabetes, cardiovascular disease, arthritis, and dementia. The main goals of this community service honors project were to provide oral health education, assess the oral health status, and treat the dental needs of elderly members at the LIFE center in West Philadelphia.

Activities and Evaluation: This honors initiative included education of both older adults and their caregivers. Through the standardized assessment of LIFE members, we identified oral health deficits and began to implement strategies to address these deficiencies in this community. In keeping with LIFE’s mission statement, this project aimed to maintain the members’ independence through proper oral hygiene instruction and encouraging sense of self-efficacy.

Lessons Learned and Program Outcomes: Through this program, dental students recognized and addressed the challenges impacting the dental management of a geriatric patient such as polypharmacy, decreased cognitive ability, and limited dexterity. The students also developed effective communication techniques in caring for older patients. For LIFE members, this project increased awareness of the connection between oral health and general health and reinforced proper oral hygiene practices for care of teeth and dentures. The information collected regarding the oral health status of West Philadelphia elderly will benefit these individuals through targeted strategies to correct shortages in dental care for the geriatric population.
**Student(s):** Boshi Zhang, Emily Ding, and Lan La

**Title:** Providing Education and Care to the Holy Redeemer Chinese Catholic School

**Community Site:** Holy Redeemer Chinese Catholic School, 915 Vine St, Philadelphia, PA 19107

**Faculty Advisor(s):** Dr. Joan Gluch, Director of Community Oral Health, Ellen Witsch, Clinical Associate Division of Community Oral Health

**Community Preceptor(s):** Dr. Lisa Cancelliere, Holy Redeemer Catholic School Principal, Father Tom Betz, Priest of the Holy Redeemer Catholic Church

The Holy Redeemer Catholic School is a private K-8 school located in the Chinatown area of Philadelphia, PA. The school has 9 classrooms with approximately 25-35 children per class, totaling around 300 children. The children at Holy Redeemer largely have parents who are recent immigrants from China, Malaysia, Vietnam, and other Southeast Asian countries. As such, most of the children are bilingual; speaking English in the classroom but Mandarin or Cantonese at home. Due to language and cultural barriers, many of these children do not receive consistent medical and dental care. While the majority of the children qualify for Pennsylvania’s CHIP program, a lack of oral health literacy in the population serves as the primary barrier to care. / Our goal was to bring oral health education and care to the Holy Redeemer community. Phase I of our project focused on providing a foundation of oral health literacy through classroom education. The topics covered included basic dental biology, nutrition, oral hygiene instruction, and other age appropriate subjects. After each presentation, oral hygiene supplies were provided to every student to promote execution of proper home care. Phase II of our project involved providing dental care to the students on-site at Holy Redeemer. We were able to provide cleanings and fluoride with portable dental units and comprehensive dental exams, sealants, and restorations on the PennSmiles Bus. / Although the number of permission slips returned from parents was lower than expected, the project was a large success. We were able to provide care to children who otherwise would not have known about their oral disease. Several children received multiple restorations and more children received sealants. There was a case where the restoration saved a child from needing endodontic treatment and another where the x-rays detected possible serious oral pathology. Additionally, we added Holy Redeemer to the rotation of schools visited by the PennSmiles Bus and future children will benefit from these visits. It was noteworthy that when the PennSmiles Bus was on-site, more permission slips were returned. It is reasonable to expect increased participation in future years as the children, parents, and faculty become more familiar with the project. It was encouraging that during on-site care visits in the spring, the children remembered our classroom education from the fall. / The lesson learned was that as a health care provider, everything we do will have significant consequences. Whether it for a single child or a whole school, our efforts can lead to positive outcomes; they are often unpredictable, but the surprises are heartwarming. The rewards that we have received while working on this project are more than what we have given. The experience of providing
care within the community was refreshing and gave us more perspective and meaning to our professional pursuits.
**Student(s):** Feiyi Guo and Fangming Li

**Title:** Chinese-Speaking Patient Care at the SDM

**Community Site:** 240 South 40th Street #122, Philadelphia, PA 19104

**Faculty Advisor(s):** Joan Gluch, Penn Dental School

**Site Description:**

a. Campus sites: Chinese Student Associations at Upenn (CSSAP), Drexel (CSSAD), University of Sciences (CSUS) and Thomas Jefferson University (CSATJ). There are over 600 incoming Chinese international undergraduate or graduate students and their families at Philadelphia. Most Chinese students expressed difficulties in finding where, how and when to seek quality dental care, as well as fear of looking for care because of language obstacles.

b. SDM: At Penn Dental School, there is good number of Chinese-Speaking patients. They are frequently experiencing difficulty in communicating with their student dentists as well as understanding their dental conditions and treatment.

c. Various community sites: Chinese Christian Church, St. Elizabeth Recovery House, Safe-Haven Veteran Homes, Path Homeless Service Day shelter, Chinese elderly homes

**Program Description:** Our program provided relevant information and education to improve access to dental care and to enhance the oral health knowledge in these Chinese communities by holding monthly information session and workshops on oral health promotion at each campus site. We partnered with Penn medical school students, nursing school, social work students and physical therapists to provide interdisciplinary care and health promotion to Chinese speaking patients in Chinese Church and senior homes. Our program also had a translation project. We translated various dental forms and health promotion brochures to both Simplified and Traditional Chinese, and explain them to patients if necessary.

**Objectives:**

- To enhance oral health knowledge and access to dental care in Chinese communities.
- To contribute to strengthening the communication between Chinese patients and SDM by providing translation at school.

**Activities and Evaluation:**

- We collaborated with Chinese Student Associations to hold a 2-hour monthly oral health promotion session at each campus site. We worked with medical school students and Penn Med to provide series of health seminars that target different aspects of health care needs for each community and population. We provided Mandarin and Cantonese translation for Chinese speaking patients for student dentists and making. In addition we also helped patients to fill in their registration works and other paper works. Patients participated in our oral health promotion session showed increased interest in oral hygiene and participating in proper dental treatment. Their concern and dental-related problems were largely addressed during health seminar. Many of them became SDM patients.
- Our translation project reduced miscommunication between Chinese speaking patients and student dentists. Patients were more happily to agree on treatment plan due to effective communication.

**Lessons Learned and Program Outcomes:**

Our program enhanced the diversity of the patient pool and helped patients from different backgrounds to gain access to oral health care in Philadelphia.
Student(s): Daniel Shimansky

Title: Dentistry with United Helping Hands Nepal

Community Site: Kathmandu, Nepal

Faculty Advisor(s): Dr. Joan Gluch, Director of COH

Community Preceptor(s): Sudhir Raj Khadka, Director of UHHN

Program Description: The trip I took to Nepal this past summer was sponsored by the International Internship Program (IIP) of the Penn Global Studies Department. / /Site Description: I was stationed in Kathmandu Nepal with the United Helping Hands Nepal (UHHN) non-profit organization. Through this organization, I worked at the Himal Dental Hospital, which provides dental services to the residents of the bustling city of Kathmandu. I also worked in the education sector at various monasteries and schools in the Kathmandu valley promoting oral health to the children, students, and monks living there. / /Objectives: The objectives set forth by the IIP were the following: to work closely under the supervision of the local medical and dental professional staff to observe and aid in the transmission of their health services, as well as to participate in various health promotion campaigns and related field work. / /Activities and Evaluation: While at the Himal Dental Hospital, I was tasked various responsibilities. These ranged from escorting patients to the surgeries, to taking Medical histories in the Nepali language, to clinical work and observation, to clinical assisting, to sterilization, to instrument exchanges, to administrative work at the front desk, and even to serving as the "dental juke-box" by providing soothing musical entertainment in the Nepali language to the patients of the hospital. While engaged in oral promotion field work, I visited numerous schools and monasteries to teach the Nepali public about many dental topics. These topics included the differences between primary (deciduous) dentition and permanent (adult) dentition; the basic anatomy of a tooth (enamel, dentin, pulp, root canal, gums, and anatomic crown and root,); what is decay and how it leads to cavities in the tooth structure; how to prevent dental caries with proper oral hygiene; how often to brush and floss the teeth; proper brushing and flossing technique; and how to identify and distinguish between foods that are beneficial for the teeth vs. foods that are destructive to teeth based on sugar levels. / /Lessons Learned and Program Outcomes: By the conclusion of the summer, I had been involved with many oral health projects both inside and outside of the schools, monasteries, and the Himal Dental hospital. Based on the positive feedback I received from the patients and doctors in the hospital, the students in the schools, and the monks in the monasteries, it was clear that my efforts successfully made a tangible impact on the Nepali population. Thankfully, the trip was just as enriching for me on a myriad of levels - professionally, socially, and culturally. Thank you to the IIP at Penn for enabling such valuable community service in the field of oral health to people across the globe.
Abstract: Oral health literacy is measured by a patient’s ability to obtain, process, and understand important oral health related information. It has been demonstrated that the oral health literacy of a parent is directly related to their child’s overall oral health status. The ability of dentists to effectively assess parental health literacy and adjust their communication with the parent accordingly is crucial in order to maximize parent comprehension and patient care.

Objectives: This pilot study assessed the relationship between oral literacy demands placed on parents by dentists, and parents’ understanding of dental information given to them during their child’s first dental visit.

Methods: Parents attending their child’s first dental visit, at the Pediatric Clinic at the University of Pennsylvania Dental Medicine, were asked to participate in this study. Prior to their child’s dental visit, participants completed a written survey in order to assess basic demographic information, primary language, and oral health literacy. A second survey at the end of the appointment measured participants’ understanding of the information provided during the dental visit. The entire appointment was audio recorded and later transcribed for analysis. Use of dental jargon, language complexity, dialogue structure, and understanding of the information provided during the dental appointment was evaluated as indicators of oral literacy demands. Descriptive statistics and correlation analysis were conducted with the use of SPSS software to evaluate the relationship among the measures of the literacy demands and parental recollection of dental concepts discussed during the visit.

Results: Descriptive analysis revealed a mean appointment duration of 23 minutes, Flesh-Kincaid 2 score, REALD-30 20.09 score, 89.5% parental understanding level, and an average of 3.48 questions asked by parents throughout the appointment. Analysis results revealed a number of changes to be made in the design of the larger scale study, which has recently begun within the dental school.

Conclusions: There is limited literature that addresses oral literacy demand within the dental field. This study is among the first to evaluate the association between oral literacy demand, and oral health literacy, in the dental clinic. Research results reveal weaknesses in the dentist-patient communication, which will help in the improvement of this interaction and ultimately in maximizing patient care.
Student(s): Christine Chen and Yi Ren

Title: Mobile Health Interventions to Improve Quality of Dental Care

Community Site: Sayre Health Clinic, 5800 Walnut Street, Philadelphia, PA 19104

Faculty Advisor(s): Joan Gluch, PhD, RDH, University of Pennsylvania, School of Dental Medicine

Community Preceptor(s): Deanne Waellart, RDH, Sayre Health Center

Site Description: Sayre Health Center (SHC) is a Federally Qualified Health Center (FQHC) located in the Cobb’s Creek section of West Philadelphia. Established by the University Of Pennsylvania School Of Medicine’s Department of Family Medicine and Community Health along with the Netter Center for Community Partnerships in 2006, Penn Dental Medicine recently joined with a dental operatory. Fully equipped to provide comprehensive dental care to the community, Penn Dental Medicine at Sayre Health Center is staffed by a full-time hygienist, part-time general dentists and current third and fourth year dental students dedicated to the center’s mission to provide high quality, culturally-sensitive, accessible school-based primary and preventative health care services to the under-served community surrounding the William L. Sayre School of the School District of Philadelphia. // Program Description: Mobile health (mHealth) interventions may have beneficial effects on increasing access to dental healthcare, particularly in resource-poor settings. Current literature has demonstrated that mobile technology is uniquely positioned to address access to care issues because of its pervasiveness across socioeconomic strati. We propose to utilize and evaluate the effectiveness of a HIPAA-compliant Short Message Service (SMS), or “text messages” on improving patient attendance and quality of dental care at Sayre Health Center. Dental patients at Sayre Health center currently receive automated voice message reminders via TeleVox. // Objectives: To assess patient interest and ability to receive reminders regarding dental appointments via SMS. // Activities and Evaluation: There is considerable potential for mobile technologies to improve communication between patient and health provider. National surveys suggest minority parents frequently communicate via mobile technology, but it is uncertain how amenable they are to receiving health care information in this format. Although the low cost and far reach of mobile health (mHealth) technology make text messaging an advantageous mode of communication with minority patients, more data on acceptance and the ability to receive SMS by patients served at Sayre Health Center is needed. Thus, this project focuses on data collection to further examine need, if any, to update the mode of communication with patients at Sayre Health Center from voice messaging to text messaging. Equally important, we aim to identify barriers to effectively utilize mobile health technology with the patient population being served at Sayre Health Center. If the data supports patient interest in updating the form in which they receive information from Sayre Health Center regarding dental appointments, we expect to move forward by implementing an interventional component, using a HIPAA compliant, and automated text
messaging service. Sayre Health Center may be an ideal pilot program to improve patient outcomes and quality of dental care.
Student(s): Ashley Abraham, Kelby Okada, Elizabeth Freund, and Giselle Galanto

Title: "Brushtime, Bedtime:" The Making of a Dental Children's Book

Community Site: University of Pennsylvania School of Dental Medicine Pediatric Clinic

Faculty Advisor(s): Rochelle Lindemeyer DMD, Penn Dental/CHOP, Stephanie Rashewski Jesin DMD, Penn Dental/CHOP

Community Preceptor(s): Jessica Lee DDS, Penn/CHOP, Evlambia Harokopakis-Hajishengallis DDS, MSc, PhD, Penn/CHOP and Cyelee Kulkarni Penn/CHOP

Site Description: The pediatric dental population of West Philadelphia is often from disadvantaged backgrounds. The latest statistics from Penn Dental's Pediatric Clinic show that 88% of the children treated are on Medicaid and have huge unmet oral health needs. These children are often very behind academically and do not have the preparation that they need to succeed in school. / / Program Description: Reach Out and Read (ROR) is an established nonprofit organization that trains pediatricians nationwide to educate parents and children about the importance of reading aloud by giving new, developmentally appropriate books to children, ages 6 months through 5 years, at well-child visits. The program is a proven intervention, as children served by ROR score three to six months ahead of their non-ROR peers on vocabulary tests, preparing them to start school on target. Language and literacy development is closely linked to a child's earliest experiences with books and stories. These early literacy interactions can be the building blocks for language, reading, and writing development. Books, Brushing, and Bedtime (BBB) is a literacy-based intervention for pediatric dentists modeled after ROR in the pediatric clinic at the University of Pennsylvania School of Dental Medicine. The study was intended as a pilot program to promote healthy bedtime routines and positive dental interactions, reduced caries incidence, and increased dental attendance in children ages 1-5. This project, making a dentally-relevant children’s book entitled "Brushtime, Bedtime," was created as an adjunct to the BBB intervention. / / Objectives: To write and illustrate a dentally-relevant children’s book reinforcing healthy tooth brushing routines at bedtime and promoting early childhood literacy; To create text and images that will appeal to the demographic of children ages 1-5; To design the text to especially reinforce the BBB message of brushing 2 times a day day for 2 minutes, especially at bedtime. / / Activities and Evaluation: We selected 100 popular children’s books for review of text, illustrations, and materials to assess the most suitable styles for our demographic of children ages 1-5. In the children’s books that promoted health or narrated children’s major milestones, we assessed the factors that made them most effective; i.e. humor, rhymes, and parent information pages. We created Brushtime, Bedtime through an extensive creative process which included multiple drafts and sketches, as well as many revisions and edits by graphic designers, early childhood educators, and attending pediatric dentists. / / Lessons Learned and Program Outcomes: Brushtime, Bedtime aids pediatric dentists by promoting healthy bedtime routines in a pleasant manner and conveying positive literacy
messages. Our book fills the void in the scarce availability of toddler books with dental messages, and aids in promoting positive dental associations for children.
Student(s): Brian Schmitz and Emily Hallam

Title: Kids Smiles

Community Site: Kids Smiles: 2821 Island Ave #210, 5828 Market St, Philadelphia

Faculty Advisor(s): Stacey Benner, Director of outreach and education, Harris Daniels, Community Education Coordinator

Community Preceptor(s): Stacey Benner, Director of outreach and education

Site Description: For my Community Honors Project I chose to volunteer at Kids Smiles, non-profit dental clinics located in South West and West Philadelphia. Both clinics serve underprivileged populations in the surrounding areas. /  

Program Description: This past year I returned to Kids Smiles, a place where I have been volunteering since I was an undergraduate. During my previous years at both clinics, I had primarily focused on patient education, both within the clinics and at nearby community centers and camps. I participated in the “Dental Detective Academy” by providing dental and general health education to children and patients in the waiting rooms of the clinics. However, while I was documenting the information I obtained from the lessons and surveys, I noticed a lack of accuracy and information within the databases. I also noticed that many patients come from far distances to obtain care, preventing regular visits. /  

Objectives: My first objective for my COH Project was to update the database records for future research that could benefit Kids Smiles. The Patient Education Databases keep track of a patient’s age, which lesson he or she has completed, and then tracks dental hygiene progress in conjunction with the completion of three health lessons. This is valuable data that can be analyzed in the future for success of the program, but it was very out of date. I also realized that it would be further benefiting Kids Smiles to include the patient’s zip code, schooling and general health information for research analytics in the future. This information was all attainable within each patient’s file at both the West and South West clinics. My goal is that Kids Smiles will be able to run data analysis and prove how effective the education program is for additional government grants. While I was going through each patient’s file, I also noted that many patients don’t return regularly. When I was imputing their zip codes and schools in the databases, I learned that some families come from many miles away for the oral health services Kids Smiles offers. I then decided that my second objective was to create a resource binder whereby patients could look up their zip code and find a practice in their area that takes their insurance. /  

Activities: After I had finished inputting all the relevant information concerning patients and their education and backgrounds into the Kids Smiles databases, I started compiling a resource manual. I included practices, clinics, health centers and the insurances they accept in the zip codes just outside of West Philadelphia. I then continued to expand the guide to include dental services available in the rest of Philadelphia and Delaware counties. This was a huge undertaking, and is still a work-in-progress. /  

Program Outcomes: When I look back on my year with Kids Smiles, I am proud of what I have accomplished but I also recognize that I have not completed all of my goals. While I am in dental school I would like to
continue with Stacey and run the research analysis on all of the data I’ve collected. I’ve learned that accurate and complete documentation in my future practice is essential. I also would like to finish the resource manual, although the task seems endless as it could extend to cover many more counties than Philadelphia and Delaware.
Introduction: 55 year-old Caucasian male presents to Penn Dental Medically Complex Clinic (MCC) with chief complaint: "I want a dental cleaning and check up." / / Past Medical History: Mixed hyperlipidemia, Chronic Kidney Disease (Stage II), B-Cell Lymphoma, Chemotherapy, HPV, HIV+, Arthritis, Tobacco use disorder, skin cancer, bilateral leg pain (Sciatica), polypharmacy. / / Current Medical and Dental Condition: Patient is currently medically stable, but should be monitored regularly with updated lab values biannually. Latest CD4 count 1635/uL. HIV viral load is undetectable. / Current dental condition is poor. Patient is partially edentulous with generalized gross dental decay. Provisional present on multiple units of teeth. Multiple endodontically treated that require immediate attention. 2x2mm red lesion present on right lateral border of tongue. Multiple aphthous ulcers present. Oral hygiene is poor. / / Treatment Plan and Goals: 1. Address red lesion on right lateral border of tongue. Rule out malignancy 2. Stabilize all endodontically treated teeth 3. Stabilize all provisionalized teeth 4. Control all active infections (Phase 1 Treatment) 5. Reevaluation 6. Phase 2 treatment with fixed and removable prosthesis 7. Recall / / Conclusions: As practicing dentist, it is important to understand the complexity of a patient’s medical history, how each medical problem is related, and how the medical problems affect dental treatment. Having had the opportunity to work in the Medically Complex Clinic, we learned to treat patients with a variety of medical conditions. With this patient after doing an extraoral evaluation, we identified a large deformity located on the backside of the patient’s head. The patient state it was due to cancer, but was unable to provide a thorough medical history. After consulting with the patient’s primary provider, we learned the deformity was due to a resection of a B-Cell lymphoma, which is a disease commonly linked to HIV+ patients. Along with the consult, we learned of many more medical problems that required modification of dental treatment. Thus, it is important to communicate with medical providers to ensure patients receive through comprehensive care.
Student(s): Jyotsna Sundar

Title: Dental Treatment Modifications for a transsexual individual

Introduction of the Patient: 31 year old transexual patient presented with pain and swelling in relation to #7. / /Current Medical and Dental Condition: Patient is a male who is HIV positive and has undergone gender reassignment surgery to become a female. Currently, requires extraction of #7 and full mouth rehabilitation. / /Past Medical History: Previously suffered a CVA on the right side, has had left hip replacement surgery. / /Treatment Plan and Goals: Extraction of #7. Complete oral prophylaxis. Restorations and Fabrication of Partial dentures to replace missing teeth. / /Conclusion: Patient has gender dysphoria and has undergone gender reassignment surgeries. Hence, caution needs to be exercised while addressing the patient as they are emotionally vulnerable trying to adjust socially in their desired role. Also, other precautions like antibiotic coverage, discontinuation of hormonal treatment and medical consultation with their PCP is essential before any dental invasive procedures.
Student(s): Caroline Fulop
   Sean Dekow
   Lindsey Rubino

Title: Management of a Clinically Suspicious Lesion in a Patient Receiving Comprehensive Dental Care

Introduction: A 50 year old male presented to the PDM Medically Complex Clinic (MCC) with a referral from an outside dentist requesting evaluation of a lesion on the inner aspect of the lower lip. This patient was previously a patient of record in MCC and received comprehensive periodontal and restorative care. / / Current medical and Dental Condition: The referring dentist requested an evaluation and biopsy of the lower lip, to rule out the presence of a traumatic ulcer. Examination revealed a 3x6mm elevated lesion with papular appearance and leukoplakia on the lower right aspect of the inner lip. Intraoral examination revealed generalized leukoplakia on keratinized surfaces and generalized gingival hyperplasia. Clinical examination results were not consistent with traumatic ulceration. Presence of intraoral lesions were not noted previously. The patient has a restored dentition with multiple direct and fixed restorations. Caries was detected on restorative examination. Periodontal examination revealed generalized moderate and localized severe periodontitis with generalized gingival hyperplasia. / / Past Medical History: Past medical history is significant for hypertension, high cholesterol, asthma, and HIV/AIDS. The patient denies tobacco use and reports EtOH consumption socially. The patient has consistently presented with elevated blood pressure readings at dental appointments and medical consultations have been written to verify medical management of his hypertension. / / Treatment Plan and Goals: A 1x3mm incisional biopsy was performed on the lower lip, and a 4mm round punch biopsy was performed on the gingiva in the left posterior mandible. Biopsy results revealed epithelial dysplasia with features of human papillomavirus, with many cells having undergone koilocytosis. The degree of epithelial dysplasia varied from mild to severe depending on biopsy site. The patient was referred to Penn OMFS for consultation for excisional biopsy. / / Long-term use of Nifedipine was considered as a possible etiology for his gingival hyperplasia. A medical consultation request was sent to consider an alternative anti-hypertensive. We continue to monitor for any reduction to the gingival hyperplasia with this change. Four quadrants of SRP were also indicated. Direct restorations were treatment planned for the carious lesions detected. #23 was deemed non-restorable and was treatment planned for extraction and replacement with an RPD. / / Conclusions: This case illustrates the importance of recognizing biopsy as a critical diagnostic tool at the disposal of the dentist. This presentation will provide a summary of biopsy types and their indications with suggested guidelines for the observation and monitoring of suspicious lesions. This case also illustrates the potential influence of medications on the condition of the oral tissues and the importance of considering the patient’s medical background when determining diagnoses and the best course of treatment.
Title: Considerations for the uncontrolled HIV+ Patient

Introduction: Mr. J is a 39 year old male who came to the Medically Complex Clinic during October 2014 for the first time in 5 years. His chief complaint was that he was “having sensitivity on the upper left teeth, can feel a crack on an upper right tooth” and that he needs “routine dental care”. // Current Medical and Dental Condition: The patient’s current contributory medical history consists of an HIV/AIDS diagnosis and a history of tobacco and alcohol use. The patient also has a familial history of non-specific heart disease on his father’s side. The intraoral exam revealed bilateral non-ulcerative erythematous lesions of the buccal mucosa extending on the right side to labial commissure with reticular and plaque-like appearance, an erythematous lesion on the middle of the palate, mild bilateral lesions of the posterior gingiva, ulceration adjacent to #7 on labial mucosa two areas of right tongue leukoplakia with hyperkeratosis, and a left tongue lesion without erythema or ulceration. With heightened attachment and bone loss, a diagnosis of severe generalized chronic periodontitis was made. There were numerous teeth with carious lesions as well. // Past Medical History: The patient had been numerous anti-retroviral medications but had since stopped taking them and had not been seen by his physician since his labs. When looking at the patient’s lab results from April 2014, it was troubling to see that the patient’s Absolute CD4 helper count was just 39/ul (normal range is 359-1519/ul) while the patient’s HIV-1 RNA copies by PCR was a whopping 25,510 copies/mL (20 copies/mL or less is undetectable). The patient also tested positive for Hepatitis A and did not test positive for Hepatitis B immunity. // Treatment Plan and Goals: As with every patient, the first goal of periodontal and dental treatment is elimination of pain and disease. It is also crucial to have biopsies performed on each lesion present in the mouth in order to rule out of diseases in the differential diagnosis and to adequately address each lesion with the proper treatment. It should be mandatory to maintain shortened periodontal maintenance intervals of 3 months for this patient as there is a history of periodontitis and anti-retroviral medications have been known to increase the acidity of the oral environment. As dental decay is eliminated, direct and indirect prostheses can be provided. // Conclusion: In an HIV+ patient, it is crucial to ensure that they are in a stable medical and dental environment. Consultation with the patient’s physician will ensure that the patient is actively participating in treatment and that the disease is properly controlled. This case offers a level of dental and periodontal complexity, and his current systemic and oral health warrant multidisciplinary healthcare approach.
Student(s): Caroline Heidt

Title: Success of bone grafts secondary to sinus lift during implant placement: a retrospective study

Objective: To determine the success of implants in the posterior maxilla after sinus lift and bone grafting using literature that used 3D imaging. // Introduction: For replacing teeth in the posterior maxilla, bone height is of the utmost concern for the placement of dental implants. Sinus lift and grafting is a common procedure that increases the alveolar bone available to place an implant without perforating the maxillary sinus. The graft is used as a scaffold for remodeling of the patient’s natural bone. During this process, the quantity of added bone is often decreased due to bone resorption. The stability of the sinus lift is imperative to the implant success because the implant can fail if too much of the surrounding bone is resorbed. // Materials & Methods: A PubMed search was conducted to find the literature available on this topic. Search keywords were: sinus lift dental implant before and after. Inclusion criteria are human studies that have sinus lift procedures prior to implant placement, implant follow-up for at least 6 months post placement, more than 10 implants studied, and CT or CBCT scans taken prior to implant placement and at the post-implant follow-up visits. Any literature that only used CT or CBCT scans prior to sinus lift or implant placement with follow-up visits of PA or PAN radiographs was not used. Exclusion for patients regarded in the study was irradiated patients, bone resection as part of an oncological treatment, and patients with IV/ oral bisphosphonates usage. Success of implants was defined as stable, bone loss within normal limits, and osseointegration. The marginal bone loss was recorded by each study and compared. // Discussion: A total of 6 studies were included. The success of the implants was averaged together, yielding a success rate of 98.81% of a total of 212 implants placed during the studies. The success of the implants was higher than other similar studies cited at 92.4-94.6% success rates (Zheng et al, 2015). The amount of decrease in marginal bone height after sinus lift and implant placement was different for each study and is compared to more fully understand the success of implant placement. No study determined the marginal loss constituted failure. The importance of this study is that it uses 3-D imaging pre-operative and post-operative to be able to assess the outcome of implants placed in sinus lifts to the greatest of our ability. CBCT is useful because of its high resolution and relative low radiation. This is even more detailed and exposes the patient to less radiation than the standard medical CT. Most literature published only used 2-D imaging, and if 3-D imaging was utilized, it was usually only pre-operative to the sinus lift surgery. After analysis of the 3D literature, the sinus lift is a predictable method for successful placement of implants in the resorptive posterior maxilla.
Student(s): Betty Yip

Title: A destructive maxillary sinus lesion encroaching nasal fossa associated with impacted third molar.

Objective: To radiographically discuss the destructive left maxillary sinus pathology encroaching the left nasal fossa via cone beam computed tomography (CBCT) imaging and to explore if impacted tooth #16 is indeed associated with this pathology. A working diagnosis of dentigerous cyst is used. / / Introduction: Dentigerous cysts are benign, non-inflammatory odontogenic cysts that are associated with the crowns of permanent teeth and thought to be developmental in origin. They are usually single in occurrence and located in the mandible. Multiple dentigerous cysts are reported in conditions such as basal cell nevus syndrome and mucopolysaccaridosis. This case report presents the radiologic CBCT findings of impacted tooth #16 with dentigerous cyst obliterating the left maxillary sinus in a non-syndromic patient. / / Materials & Method: A search of PUBMED from 1990 to 2014, using the key words dentigerous cyst, maxillary and cone beam computed tomography, was conducted. A total of six articles were found in the literature with this search. This information was used to formulate a good differential diagnosis based on the presenting complaints, examination findings, and CBCT features. / / Discussion: A 62 year-old African American male was referred to the SDM radiology division from his oral surgeon with a painful mild facial swelling in the left cheek. The patient reported a “bad taste” that persisted for six months. Past medical history was significant for hypertension, asthma, and diabetes that are managed with oral medications (hydrochlorothiazide, amlodipine, and metformin). The patient was a social drinker and denied recreational drugs or tobacco use. Physical examination of the patient was unremarkable except for the facial asymmetry. Intraorally, a milky purulent and malodorous discharge with vestibular edema originating from distal of #15 with probing depths of more than 15 mm presented. A review of routine laboratory blood tests by his oral surgeon were within normal limits. A panoramic radiograph obtained by the referring surgeon revealed a full bony impacted tooth #16 with a large radiolucent lesion in the left maxillary sinus. A review of the CBCT scan (suprahyoid to infraorbital), led to a differential diagnosis that included dentigerous cyst, odontogenic keratocyst, ameloblastoma, odontogenic myxoma, and a large radicular cyst. A further review of the CBCT scan revealed destruction of the medial wall and involvement of ethmoid air cells and nasal fossa. It was concluded based on the CBCT that the cystic lesion in association with impacted tooth #16 was extending into the maxillary sinus, eroding the medial wall and encroaching on the nasal anatomy. A review of literature revealed that involvement of nasal fossa and the ostiomeatal complex is a rarity and should be dealt with extreme caution for the surgical enucleation and treatment is far more extensive than a simple enucleation of a dental cyst.
Student(s): Prescott A. McWilliams

Title: Orthodontic Diagnosis and Treatment Planning of Impacted Canines Using Three-Dimensional Imaging

Objective: To demonstrate the utilization three-dimensional (3D) imaging in diagnosing and treating patients with impacted canines. / / Introduction: The use of 3D imaging, such as cone-beam computed tomography (CBCT), in dentistry has increased rapidly over the last decade; with accessibility growing as costs and patient radiation dosages decrease. Three-dimensional imaging and computational analysis provide an additional dimension of information, resulting in highly accurate measurements of facial structures and resolving many interpretative complications of two-dimensional (2D) imaging, such as superimpositions and magnification errors. The detailed spatial positioning provided allows the treating physician to analyze a more complete image of the dental and craniofacial development of the patient and better localize pathoses. In patients that display canine impactions, 3D imaging is crucial to accurately identify the severity of the impaction and properly treat the patient. / / Materials & Method: A search of PUBMED for all years, using the key words, “CBCT and Orthodontics and Impaction” was conducted. A total of 39 articles were returned by this search, of which 4 were directly relevant to the research objective. / / Results: In cases of impacted canines that had been assessed using only 2D imaging, the introduction of 3D analysis caused a change in the diagnosis of the impacted canine in 26% of cases, and resulted in a different treatment plan in 24% of cases. / / Discussion: Three-dimensional imaging gives the physician the ability to discern the exact location of the impacted canine, the way it will present in the surgical field, and the effects of that tooth on the adjacent structures. Diagnosis and treatment planning of the cases using only 2D imaging tended towards observational and interceptive therapy, but the addition of 3D analysis resulted in a different diagnosis in a large majority of cases and a different treatment plan in an equally large majority of cases, generally tending towards a more surgical approach. Nearly 1 in 4 patients with impacted canines can neither be properly diagnosed nor treated with traditional 2D imaging, ergo the use of 3D imaging, such as CBCT, should be considered as a definitive modality for diagnosis and management of impacted canines. /
Student(s): Alice Bassani

Title: A Radiographic Analysis of NERB Screenings

Objective: The goal of this study was to determine how many additional radiographs were taken for our patients screened for the North East Regional Board (NERB). / / Introduction: Every year senior dental students around the country are required to take a regional licensing examination, screening patients for “ideal” lesions that will be treated on the date of their exam. In addition to a clinical examination, radiographs are obtained that will be presented to the board examiners. Radiographs must be of diagnostic quality and reflect the current clinical condition of the mouth. For the restorative section a candidate must present a periapical and bitewing radiograph for a posterior tooth. An anterior tooth requires only a periapical image. Interproximal caries must be shown radiographically to penetrate at least to the dentoenamel junction (or have equivalent depth clinically). The candidate manual states that “Radiographs must not be retaken simply to produce a ‘perfect image.’ Radiographs that have minor errors… will not result in any loss of points and should not be retaken. Radiographic technique is not being evaluated in this part of the examination.” Despite these guidelines, candidates take excessive numbers of radiographs to present the “perfect image” of the caries in question. This study evaluate how candidates obtain the radiographs and what numbers are reached before it is acceptable to candidates. / / Materials & Method: 100 patients screened for the NERB were randomly selected. Only patients who received a Full-Mouth Series (FMX) were assessed, defined as 10 or more images consisting of both bitewings and periapicals. These FMX were evaluated on total number obtained, the types of radiograph obtained (PAs versus bitewings), and number of each type. Further evaluation was conducted to determine how many retakes were taken for posterior PAs, bitewings, and anterior bitewings. From this number we were able to calculate the percentage of series that required retakes and on average how many additional images were needed to adequately capture a specific area (posterior PAs, bitewings, and anterior bitewings). / / Discussion: Of the 100 patients screened, 72 patients received an FMX. On average these patients had 17.875 images taken, breaking down to approximately 5.833 bitewings and 12.028 periapicals (combined posterior and anterior) per examination. From this data we know that retakes of the bitewings were taken since an 18 image FMX contains only 4 bitewings. As we evaluated further, the data was defined by region: posterior PAs, bitewings, and anterior PAs. The numbers and percentage of series requiring retakes were 25 for posterior PAs (34.7%), 47 for bitewings (65.3%), and 43 for anterior PAs (59.7%). The number of additional images per section were 2.44, 2.32, and 2.63 respectively per section.
Student(s):  Debbie Schub

Title:  Styloid chain ossification in asymptomatic dental patients: A review

Objective: To review the styloid chain ossification in asymptomatic dental patients

Introduction: Styloid chain ossification (SCO) and elongated styloid process (ESP) are common findings in head and neck radiology. For the majority of patients, styloid ossification is asymptomatic and is discovered as an incidental finding on routine radiographs or diagnostic imaging for other purposes. Symptoms of ES can include dysphagia, pain upon neck rotation, or other neck and cervicofacial pain. Newer studies either comparing panoramic radiographs to CT imaging, or using CT imaging alone have provided insight into the prevalence, morphology, and patterns of styloid chain ossification.

Materials & Method: A review of the literature from 2000 to 2015 was undertaken and databases were searched for pertinent articles using keywords, “styloid elongation”, “styloid chain”

Discussion: The currently accepted threshold guideline for elongated styloid process (ESP) is 25 mm, though variation exists in the literature. However, an elongated ESP is not always symptomatic, and additionally certain factors, for example, presence of a mobile pseudo-articulation within the ossification, have been proposed to mediate symptoms. Therefore, the ability to diagnose and analyze ESP with three-dimensional imaging has become increasingly important, as current literature indicates that SHC medial angulation, morphology, and directionality of ossification all may strongly influence whether SCO presents with symptoms and can play significant role in the pre-operative surgical planning of symptomatic patients. In this literature review, a total of 2,595 styloid processes were evaluated by CT imaging (CBCT, MDCT, and MDCTA). Of this group, 2,179 styloid processes were evaluated in asymptomatic patients. These patients had CT imaging performed for other purposes such as analysis for implant placement, sinus imaging, TMD pain, or other non-related symptoms. All patients in the asymptomatic group presented with no classical symptoms of Eagle’s Syndrome. In this asymptomatic group, 1,529 elongated/ossified styloid processes were found (70.2%). Of these 2,179 asymptomatic SPs, 1,970 SPs were evaluated for laterality, of which 1,030 were bilaterally ossified and 299 were unilaterally ossified. The remaining 641 SPs had other anomalies which excluded them from this analysis. Of the total SPs evaluated, 2,079 were evaluated for segmentation, of which 325 SPs were found to be segmented (15.6%). A cohort study of 208 patients presenting with orofacial pain was conducted, and a total of 416 styloid processes were evaluated by CBCT imaging. Of this group, 180 styloid processes had ossification (86.6%), of which 136 elongations were bilateral (75.6% of symptomatic ESPs), and 44 elongations (24.4% of symptomatic ESPs) were seen unilaterally.
Title: Concurrent occurrence of florid cemento-osseous dysplasia, simple bone cyst, & canine transmigration

Objective: This report presents a rare case where an florid cemento-osseous dysplasia (FCOD) with simple bone cyst (SBC) was noted along with transmigration of mandibular right canine, evaluated via clinical, radiographic and cone-beam computed tomography (CBCT) findings. / /

Introduction: FCOD is a benign jaw lesion usually asymptomatic and diagnosed incidentally on dental radiographic examination. The SBC is a pseudocyst that can occur as a solitary entity in the jaws or may occur in association with cemento-osseous dysplasia (COD). Mandibular canine transmigration is a rare dental ectopia that creates surgical, orthodontic, restorative, and interceptive problems. / /

Materials & Method: A 26-year-old female patient presents for evaluation of lower left third molar tooth, which is causing pain and discomfort. A panoramic radiograph followed by CBCT reveals mandibular FCOD with SBC along with transmigration of mandibular right canine. A thorough clinical and radiological examination was performed. / /

Discussion: The patient diagnosed as FCOD with SBC along with transmigration of canine and was recommended for periodic follow-up until there is sign of infection or any form of inflammation, like in osteomyelitis. Transmigration of mandibular canine may require surgical and orthodontic or restorative management. The transmigratory pattern of tooth # 27 was evaluated and found to conform with type 4 of Mupparapu’s original classification (2002). Radiographic examination is significant for the diagnosis of FCOD, especially in the asymptomatic cases. The role of a dentist is to ensure the follow-up of the diagnosed patients and to take the necessary clinical measures to prevent misdiagnosis with apical lesions and refer for treatment if necessary.
Student(s): Yuliya Khodak

Title: Efficacy of Panoramic, CBCT and MRI in patients suspected with BRONJ: A literature review

Objective: Bisphosphonate-related osteonecrosis of the jaws (BRONJ) now being referred to as Medication related ONJ (MRONJ) is a well-known clinical entity that is seen in dental patients as a bone complication after chemotherapy and also in patients with osteoporosis. The purpose of this research is to conduct a literature review to compare panoramic radiography (PAN), cone-beam computerized tomography (CBCT) and magnetic resonance imaging (MRI) as an imaging tools that help to diagnose and monitor BRONJ. / / Introduction: Oral bisphosphonates are commonly prescribed to stabilize bone loss caused by osteoporosis and are frequently used to treat osteopenia. More potent bisphosphonates are delivered intravenously and are indicated to stabilize metastatic cancer (primarily breast and prostate) deposits in bone, treat the bone resorption defects of multiple myeloma and correct severe hypercalcemia. Starting from 2003 multiple cases have been reported regarding the development of BRONJ as a serious complication of such treatment and nowadays represents a growing concern for dental practitioners. Different imaging examination methods are needed to provide the clinician with valuable information regarding the course, magnitude, and progression of the disease, guide therapeutic options, and monitor the treatment response. Early diagnosis of BRONJ is vital because it takes time for bisphosphonates to be removed from bone after cessation of treatment. / / Materials & Method: PubMed, OvidMedline & Cochrane databases were used to search for the following key words: “bisphosphonates”, “osteonecrosis of jaw”, “panoramic radiography”, “CBCT”, “MRI”, “BRONJ”. 127 articles published from 2003 to 2015 were found, from which 23 articles that best met the objectives were included. Data was extracted and analyzed. / / Discussion: Panoramic radiography is the first and most often used examination to be performed in patients with suspicion and monitoring of BRONJ. However, with increased availability of CBCT, it became a standard preoperative imaging work-up for patients with suspicion of BRONJ. It is very useful for the ability to see and characterize the extension of the lesions and detecting cortical involvement. A comparison of the sensitivity of CT and panoramic x-rays in the diagnostic evaluation of BRONJ indicated that panoramic radiographs tend to underestimate the extent of lesions and miss the presence of small sequestra. MRI that was traditionally reserved for patients with have soft-tissue extension now is becoming very promising technique for early detection in patients susceptible to BRONJ. Although MRI as well as CBCT have a high detectability for BONJ lesions that exceeds that of panoramic radiographs, by far, both techniques show problems with the exact assessment of the extent of BONJ lesions in the individual patients. Therefore, the relevance of MRI and CBCT for the preoperative assessment of the extent of BONJ lesions is somewhat limited.
Student(s): Amy Patel

Title: A review of technical errors on panoramic radiographs obtained at the School of Dental Medicine

Objective: This study was done to assess the frequency of ten different positional and instructional errors when taking panoramic x-rays at Penn Dental Medicine in the Oral Diagnosis and Emergency clinic. // Introduction: High quality radiographs are an integral component of dental treatment. Positioning and instructional errors are often directly responsible for inadequate diagnostic quality images. Many radiographs taken are of poor diagnostic quality. This often results in incorrect diagnosis and inadequate treatment planning. The aim of the study was to assess the positional and instructional errors in panoramic radiographs to prevent future occurrences. // Materials & Method: This study looked at randomly selected 122 panoramic x-rays that were taken at Penn Dental Medicine from January 2014 to December 2014 in the Department of Radiology and assessed the frequency of different positioning and instructional errors. All panoramic x-rays were viewed on MacBook Air Color LCD 13” display using MiPacs. Errors were recorded in Microsoft Excel and all values were calculated using Excel. // Each image was assessed for the following ten errors: 1) Positioned in front of focal trough 2) Positioned behind focal trough 3) Missing condyle 4) Chin tilted down 5) Chin tilted up 6) Position of tongue 7) Incorrect posture 8) Patient movement 9) Removal of jewelry or hair pins 10) Position of lead apron // Discussion: The images used in the study were from the previous fiscal year. The radiographs were randomly selected and the technicians taking the radiographs were not aware of this study. The sample may be greatly representative of everyday panoramic radiographs. All the panoramic were taken digitally. After careful review of 122 panoramic x-rays taken throughout the year, at least one or more errors were noted 90.16% of the time. The most common error was the position of the tongue (45.1%). The second most common error was positioning in front of the focal trough (43.4%). The high incidence of positioning and instructional errors can lead inadequate x-rays as well as the need for additional x-ray exposure.
**Student(s):**  Courtney Lam

**Title:**  Correlation of the Slopes of the Articular Eminence to Degenerative Joint Disease in the TMJ

**Objective:** This study examines if the slope of the articular eminence, as found on a panoramic radiograph, is correlated to the degree of degenerative bone disease (DJD) of the temporomandibular joint (TMJ).  

**Introduction:** The panoramic radiographs is one of the most common radiographic images taken in a dental office, ergo it is important to know what conclusions and diagnoses can be made using this type of imaging. There is no existing literature to determine if this is an adequate way of diagnosing DJD of the TMJ by morphometric analysis of articular eminence alone.  

**Materials & Method:** Obtained 136 panoramic radiographs from the University of Pennsylvania School of Dental Medicine database for use in this study. The slope of the articular eminence was measured using the midline of the articular eminence and measuring the angle between a line parallel to the posterior slope and a line parallel to the anterior slope. This measurement was made bilaterally on each panoramic radiograph. Panoramic radiographs were excluded if the condylar head overlapped with the articular eminence or if the articular eminence or the head of the condyle was not fully visualized in the radiograph (n=36). DJD of the TMJ was determined using six criteria (1) flattening of the superior portion of the condyle (2) evidence of reduced joint space (3) Sclerosis of the glenoid fossa or the head of the condyle (4) presence of subcondylar cysts (5) flattening of the posterior slope of the eminence (6) flattening of the anterior slope of the eminence.  

**Discussion:** The average angle of the articular eminence in patients without DJD was 110.91 degrees while the average angle of the articular eminence of a TMJ with DJD was 130.68. However, this was found to be not statistically significant using the z-test (p<0.05). There were difficulties in evaluation of DJD since panoramic radiographs do not provide a consistent or adequate view of reduced joint space or sclerosis of the glenoid fossa or sclerosis of the head of the condyle. Other difficulties include positioning errors during panoramic radiographs and variations in the focal trough, all which may skew the measurement of the slope of the articular eminence and or the visualization of the shape of the condyle. Examining the slope of the articular eminence in panoramic radiographs is not conclusive in determining DJD of the TMJ. Future studies should utilize a different type of imagining that has fewer variations and more consistency, such as cone-beam computed tomography (CBCT).
**Student Name:** Jaskaran Saggu  

**Title:** MREG Knockdown in THP-1 Cells  

**Co-Author/Faculty Advisor:** Dr. Kathleen Boezse-Battaglia, Department of Biochemistry

**Introduction:** Macrophages degrade phagocytosed or larger intracellular cellular cargo through phagocytosis and autophagy. In phagocytosis, specialized cells engulf apoptotic cells, pathogens or other debris. Through receptor ligand interactions and formation of pseudopods, the cargo is internalized in sealed vesicles called phagosomes. Phagosome mature through fusion with lysosomes and other endosomes becoming the degradative phagolysosome. Evidence suggests that Melanoregulin (MREG), a small highly charged cargo sorting protein, regulates intracellular trafficking and lysosomal intermediates common to both degradative pathways. The Boesze-Battaglia lab has observed that upon macrophage challenge with live P. gingivalis, MREG expression is upregulated and lysosome formation is increased. In murine macrophages [J774.1 cells], 29% of FITC labeled P. gingivalis colocalized with LC3II and MREG positive autophagosomes. This coupled with previous studies suggest P. gingivalis escapes immediate degradation through its colocalization with MREG and LC3II positive autophagosomes in murine macrophages through preventing autophagosomes maturation allowing P. gingivalis to survive in nutrient rich intracellular niches.  

**Methods:** The aim of this research project is the reduce MREG expression in THP-1 Cells, human derived monocytes, and proceed to use confocal microscopy based co-localization studies of P. gingivalis with various autophagosome markers. These markers include LAMP-1, LAMP-2, EEA1, Syn 7, and Cat-D. This study can be split into two parts: (1) knockdown MREG expression; (2) Perform colocalization studies with THP-1 transfected with P. gingivalis with reduced or normal levels of MREG expression.  

**Results:** Using lipofectamine 2000, I have been attempting to knockdown MREG expression in THP-1 Cells. The overall protocol involves differentiating THP-1 monocytes into macrophages, and then incubating cells in different concentrations of both the lipid vector and RNAi for different amounts of time. After treating the cells for 24Hr, 48Hr or 72Hr; protein from these cells is isolated and analyzed on a western blot to determine the success or failure of the specific treatment conditions.  

**Conclusion:** So far lipofectamine’s lipid vector has proven cytotoxic for differentiated THP-1. Cell death likely increases post incubation with the lipid reaching 90-100% cell death by 72Hr. Although no stable knockdown protocol exists, the next steps are to continue varying the conditions until a stable repeatable protocol can be received providing sufficient MREG knockdown to proceed.
**Student Name:** Riddhi Desai

**Title:** Defining a role for actin and myosin during Drosophila salivary gland secretion

**Co-Author(s)/Faculty Advisor(s):** Duy T. Tran NIDCR at the National Institute of Health, Kelly Ten Hagen NIDCR at the National Institute of Health

**Introduction:** Regulated exocytosis is a process by which secretory cells deliver proteins to the cell surface and extracellular matrix. These proteins are synthesized in the endoplasmic reticulum, traverse the Golgi apparatus, and are packaged into specialized vesicles for transport to the plasma membrane. Given an appropriate stimulus, secretory vesicles will then fuse with the plasma membrane and release their contents into the extracellular space. Drosophila salivary glands are the largest secretory structures of the fly and represent a tractable experimental system for studying organ function and the factors that regulate secretion. / / **Methods:** Using transgenic flies expressing a GFP-tagged secretory protein (Sgs3-GFP), we were able to visualize secretion in real time. Additionally, using transgenic flies expressing both GFP-tagged myosin II (Zipper-GFP) and RFP-tagged actin binding protein (LifeAct-RFP) we determined that actin and myosin II were recruited to fused secretory granules. Surprisingly, when actin polymerization was inhibited with Latrunculin A, myosin II was still recruited to granules. To define the proteins interacting with myosin II and to further characterize the process of secretion we then performed immunoprecipitations of myosin II-GFP from salivary glands. GFP-tagged myosin II was isolated using magnetic anti-GFP beads. / / **Results:** Western blot analysis of the immunoprecipitations revealed that we were able to capture myosin II. Furthermore, we found that in both non-secreting and secreting glands actin was co-purified. Additionally, coomassie blue staining of the immunoprecipitations showed various protein bands that were co-purified with myosin II. In untreated secreting glands or glands treated with Latrunculin A, distinctive protein bands can be observed that are not found in non-secreting glands. / / **Conclusions:** These proteins may be responsible for recruitment of myosin II to the granules when actin polymerization is blocked by Latrunculin A. Together, our studies define key steps in exocytosis and provide potential target proteins that may play important roles in regulated exocytosis. /
Introduction: Early childhood caries (ECC) is one of the most common chronic diseases affecting children in the United States. Nearly 40% of children when they reach kindergarten have one or more caries. 25% of children account for 80% of the caries. However, research lacks identifying the relationships of cariogenic parental practices. The objective of this clinical study was to compare the different effects of parent’s beliefs and attitudes for nutrition, oral hygiene and common dental guidelines on their child’s oral health. 

Methods: Fifty-one parent/child (between the ages of 3 to 5 years old) dyads presented at the University of Pennsylvania School of Dental Medicine’s pediatric department for a routine 6 month oral exam. The parent completed an even point Likert questionnaire with 15 questions to determine their dental beliefs and attitudes. Three types of beliefs and attitudes questions were covered in the questionnaire: nutrition, oral hygiene, and common dental guidelines. The questions for nutrition covered perceived healthy food choices and different types, accessibility, and frequencies of foods being eaten. The questions for common dental guidelines covered school absences for dental appointments and attending appointments. The questions for oral hygiene covered frequency of brushing and direct vs. indirect supervision of hygiene. Parents responded to each question indicating they “strongly agreed,” “somewhat agreed,” “somewhat disagreed,” or “strongly disagreed.” Questions were scored a positive or negative value dependent on the effect it might have on their child’s oral health. DMFT score was calculated for each child from the 6 month oral exam and compared to the parent’s responses on the questionnaire. An ANOVA test \((P<0.05)\) was used to determine the significance of the correlation.

Results: The DMFT scores of the patients ranged from 0-12. The parents of a child with a DMFT score of 0 averaged positive attitudes and beliefs on 82% of the questions \((P=0.005)\). DMFT scores of 1-3 averaged positive attitudes and beliefs on 78% of the questions \((P=0.04)\). DMFT score from 4-12 had positive attitudes and beliefs on 69.5% of the questions \((P=0.04)\). For nutrition questions, DMFT 0 had 90% \((P=0.02)\) positive response, DMFT 1-3 had 85% \((P=0.05)\), and DMFT 4-12 had 78% \((P=0.004)\). For oral hygiene questions, DMFT 0 had 71% \((P=0.03)\) positive response, DMFT 1-3 had 66% \((P=0.04)\), and DMFT 4-12 had 65% \((P=0.005)\). Lastly, for common dental guidelines questions, DMFT 0 had 84% \((P=0.01)\) positive response, DMFT 1-3 had 78% \((P=0.04)\), and DMFT 4-12 had 65% \((P=0.01)\).

Conclusion: Parents that displayed positive dental beliefs and attitudes were more likely to maintain good oral health in their children. Parent’s beliefs and attitudes regarding nutrition and common dental guidelines were more predictive in effecting their child’s oral health than were oral hygiene beliefs and attitudes. More prospective studies creating beliefs and attitudes modeling need to be done in an attempt to see if positive changes in parental beliefs and attitudes can positively influence oral health statuses.
Introduction: Resin-based restorative materials require stable adhesion to tooth structures for clinical success. Our observation suggested that MMP-dependent collagen degradation play a significant role in the adhesive property in restorations. Thus, we hypothesized that a pretreatment application of CHX to inhibit dentin MMPs has clinical significance in the durability of dental materials. This study investigated the influence of 2% chlorhexidine (CHX) digluconate pretreatment on dentin bond strength durability of a one-bottle adhesive system after one-year in vitro aging. / /

Methods: Flat occlusal dentin surfaces were prepared immediately after removing cusps of extracted human molars (N=32). The box-type cavities (5x3x1.5mm) were prepared on the flat occlusal surfaces. The teeth were then randomly divided into two distinct experimental groups of 16 teeth as immediate (IM) and thermo-mechanical aging (TMA) study groups. Half of the teeth (n=8) in each group were restored after the application of acid etch (15s) and 2% CHX (60s) to dentinal cavity walls. For all groups, composite resin blocks were built up over the bonding agent (Prelude one, Danville Materials, CA) application. For aging, the teeth were exposed to a thermocycling regiment of 20,000 cycles between 5o C and 55o C and then placed in a chewing simulator (TMA; 240,000×50N) for simulation of oral conditions. The restored cavities were vertically sectioned to obtain 1.0 +/- 0.1 mm2 cross-sectional composite- dentin beams. Microtensile bond strengths were measured at a crosshead speed of 0.5 mm/minute. Data were analyzed with a two-way ANOVA and Tukey’s HSD (p<0.05). / /

Results: Bond strengths were the same in both IM (w/o and with CHX) groups (p>0.05). Additionally, the TMA groups exhibited increased bond strengths in comparison to the bond strengths of both IM groups. Further, between the TMA groups, CHX application provided the highest bond strength. / /

Conclusion: Pretreatment of dentin surfaces with CHX increases bond strength durability after in vitro aging.
Student Name: Nishat Shahabuddin

Title: Role of lipid rafts in leukotoxin localization

Co-Author(s)/Faculty Advisor(s): Dr. Edward T. Lally Department of Pathology, Dr. Kathleen Boesze-Battaglia Department of Biochemistry

Introduction: Aggregatibacter Actinomycetemcomitans is a gram-negative pathogen that contributes to Localized Aggressive Juvenile Periodontitis (LJP). One of its virulence factors is LtxA, a 114kDa member of the Repeats-in-Toxin (RTX) family of cytotoxins. LtxA-mediated cytotoxicity proceeds through an association with leukocyte function-associated antigen-1, a β2 Integrin (LFA-1) present in human T lymphocytes. Previous work has shown that LtxA and LFA-1 cluster in lipid rafts, and that localization to these rafts is essential for LtxA-mediated cytotoxicity. A later phase of LtxA-mediated cytotoxicity is thought to involve an apoptotic signal through the LFA-1-LtxA interaction. However, the effect of initial membrane associations on the final intracellular target of LtxA requires further studies. Preliminary studies on LtxA suggest that toxin entry and the presence of bacteria may upregulate autophagocytic proteins, thus providing a basis for our hypothesis that autophagosomes play a critical role in A. actinomycetemcomitans-induced cell death. These double-membraned organelles fuse with lysosomes to allow for intracellular recycling. They contain cargo receptors with light chain 3-interaction regions (LIRs) that allow for binding to light chain 3 (LC3) on various cargo. Upon binding, the LC3 group is cleaved off and lipidated to convert LC3-I into LC3-II. Thus, as a measure of autophagocytosis that occurs within a cell, levels and localization of LC3-I and LC3-II can be monitored. // Methods: LtxA was first isolated from virulent JP2 strains of A. actinomycetemcomitans. The bacteria were grown in media for 48 hours under anaerobic conditions and then pelleted from the media. LtxA was isolated using ion exchange chromatography. SDS-PAGE and Western Blots confirmed isolation of the 114kDa LtxA. Next, an immortalized human T lymphocyte cell line was incubated with LtxA, as well as with virulent JP2 strains of A. actinomycetemcomitans. To ask whether cholesterol in lipid rafts was important to LtxA and A. actinomycetemcomitans upregulation of autophagosomes in target cells, incubation with 5mM MBCD was used to deplete membrane cholesterol. An Amplex-Red Cholesterol Assay Kit was used to fluorometrically confirm the changes in membrane cholesterol. Cells were infected with 10-9M LtxA and 100 MOI of A. actinomycetemcomitans. Lysates were extracted using Radio-immunoprecipitation Assay Buffer (RIPA) buffer, and a western blot against LC3-II measured autophagocytic flux. // Results: Lymphocytes infected with LtxA and A. actinomycetemcomitans alone and in conjunction do not show clear trends with regard to autophagy, with or without the presence of membrane cholesterol. However, future directions of the project include the use of fluorescence microscopy to determine whether LtxA colocalizes to autophagosomes using membrane cholesterol. // Conclusions: It was hypothesized that cholesterol depletion would lead to decreased autophagocytosis, but the data proved to be inconclusive.
Introduction: Muscle regeneration is a multi-step process involving the migration and differentiation of satellite cells. Impaired muscle regeneration may lead to fibrosis and muscle degenerative diseases. Matrix metalloproteinases (MMPs) are important in muscle repair and are potential targets for the treatment of these diseases. MMP-13, found only in damaged muscle, is a collagenase for interstitial collagens I, II, III, and IV that has activating functions for other MMPs (Leeman 2002). Satellite cell migration decreases when MMP-13 is inhibited and increases when MMP-13 levels are raised. Although the mechanism is unclear, MMP-13 is found in the proliferating phase and in myotube formation (Lei 2013). The goal of the study is to investigate the effects of MMP-13 on satellite cell migration and myotube formation.

HYPOTHESIS / MMP-13, an essential component in muscle regeneration, degrades extracellular matrix proteins and allows for the migration of satellite cells. MMP-13 is more critical for the migration and differentiation of satellite cells in a fibrotic collagen matrix relative to a typical basement membrane. / Methods: Satellite cells are isolated for culture from MMP-13 KO and WT mice. EDL muscles are dissected and separated in collagenase. The cells are isolated through centrifugation and filtration, proliferate on Matrigel, and are transferred to Transwells coated with either Basement Membrane Extract (BME) or type I collagen. After 3 days, the cells are fixed, stained with crystal violet, and counted on microscope images. In another experiment, isolated KO and WT satellite cells are grown on coverslips with BME or type I collagen matrix. Differentiation occurs for three days and the cells are fixed and stained for myosin heavy chain. Images are analyzed with microscopy to quantify myotube formation. / Results: 1-There is a significant decrease in the number of migrating MMP-13 KO cells compared to the WT in the BME (p=0.05) but not in the collagen matrix. 2-Migration occurs at a faster pace in the BME than in the collagen matrix for both KO and WT groups. Minimal migrating cells was observed in the collagen matrix. 3-The images suggest that myotube formation occurs for MMP-13 KO cells in type I collagen matrix and in BME. Additional image analysis is needed to quantify myotube formation. / Conclusion: 1-The results suggest that MMP-13 is more essential to the degradation of BME than type I collagen. This result is confounded by the fact that there was an insufficient number of migrating WT and KO cells. The significant effect of MMP-13 on migration in BME (containing type IV collagen) may illuminate its role in muscle regeneration. 2-A lack of cells migrating through the collagen may be due the high density of the matrix or to the need for more time to break down type I collagen. 3-If MMP-13 is necessary for satellite cell migration, then enhancing its activity may have the potential of treating muscle degenerative diseases.