Dear students and colleagues,

Every year, it is with great excitement that I await the arrival of Research Day, which, as many of you know, is one of USC’s only days devoted exclusively to students’ scientific inquiry. It gives me such satisfaction to see the curiosity and excitement on the faces of faculty and students as they talk about the results of their research. I especially enjoy seeing colleagues sharing their newfound knowledge with each other, allowing one great idea to spark another to spark another, which is precisely how scientific revolutions get their start. I can always count on learning something new each year, and I hope, after today, you can say the same.

As part of a research-intensive university, we at the Herman Ostrow School of Dentistry of USC take scientific inquiry and discovery very seriously. As many of you might know, Ostrow has consistently been the top-funded private dental school since 2012 by the National Institute of Dental and Craniofacial Research. There’s perhaps no greater compliment than to have this national organization, which aims to improve oral, dental and craniofacial health through research, believe so strongly in the work that our researchers do every day.

This commitment to research doesn’t stop with dentistry. Our colleagues at both the USC Chan Division of Occupational Science and Occupational Therapy and the USC Division of Biokinesiology and Physical Therapy, who join us here today, are also among the top thought leaders of their professions, regularly publishing high-impact journal articles that push their fields into ever-exciting directions.

We believe this focus on scientific inquiry, and to life-long learning in general, is critical for our students to go on to enjoy successful careers. The world our students will practice in is incredibly dynamic, with new technologies and innovative ideas changing the professional landscape all the time. The ability to think critically, to scrutinize data and to stay ahead of the constant changes will be imperative for future professionals in dentistry, occupational therapy and physical therapy to remain among the top of their professions.

As we embark upon this day, I’d like to congratulate all our faculty and student researchers. I am incredibly proud of your hard work, dedication and your scientific curiosity.

Fight On!

Avichai Sadan, DMD, MBA
Dean
G. Donald and Marian James Montgomery Professor of Dentistry
Herman Ostrow School of Dentistry of USC
Dear Colleagues,

Welcome to Herman Ostrow School of Dentistry of USC Research Day 2017! Every year I look forward to hosting this exciting event at the Galen Center and seeing what groundbreaking research is being conducted by our students, staff, and faculty in Dentistry, Occupational Science, Occupational Therapy, Biokinesiology, and Physical Therapy.

Our students have the privilege to conduct cutting edge research during their time at USC. This is truly a “value added” experience that only a selected few top-tier research universities can offer, and I commend students who take advantage of this incredible opportunity. At USC, one of the goals shared by all of our life science faculty is to promote research that will improve health throughout the human lifespan. This is reflected very well at Research Day, which showcases research that will address challenging problems facing health care providers today. We see clearly how our research can benefit those from all walks of life, at all stages of life.

All of the faculty who conduct basic, translational, and clinical research at the Ostrow School welcome students into our laboratories. We strongly encourage motivated high school, undergraduate, and graduate students to join us and learn firsthand how the frontiers of science and medicine advance through hard work and dedication. We also strongly encourage our students to pursue academic careers, which—in my perhaps biased opinion—are highly rewarding and can make a tremendous impact on patient care. Our students are the future of our profession. We must invest in them. Based on the record number of outstanding discoveries being presented today, I am more confident than ever that our Trojan family is full of future academic leaders. Please join me in congratulating all of our students and researchers on their successes as we gather to showcase their efforts on Research Day.

Fight on!

Yang Chai, DDS, PhD
Professor
George and MaryLou Boone Chair in Craniofacial Molecular Biology
Associate Dean of Research
Director, Center for Craniofacial Molecular Biology
Herman Ostrow School of Dentistry of the University of Southern California
From the Dean
Avishai Sadan, DMD, MBA

Introduction to Research Day
Yang Chai, DDS, PhD

Oral Diagnosis Reinvisioned
Daniel Adelpour, Judith Naziri

Computer-Guided Orthodontics
Cory Nasoff, Payam Shaaf

Advancing Techniques in Craniofacial Surgery
Rachna Shenoy, Iriff Ulep

Revolutionizing Dental Care for Special Patients
Ruhee Jaffar, Meha Patel

Dedication in Pediatric Dentistry
Mona Dousti, Leora Sheily

Learning May Never Be Paused
Shruti Dandu, Edmond Onwukwe

Innovation in Education
Ariana Rodriguez, Arzah Wafatalia

Pioneer in Restorative Dentistry
Davita Danesh, Daniel Kohanchi

75 Years in Occupational Therapy
Mike McNulty

Revealing the Secrets of Enamel
Aimi Nguyen, Arian Barnoty

A Journey Towards Biomimetic Dentistry
Anna Imran, Monika Kunder

VR-Based System for Walking Rehabilitation
John Hobbs

Our Digital Era of Dental Science
Susan Park, Kerry Cheng

Paving the Way in Oncologic Research
Natalie Inoue, Krista Primley

Keynote Speakers
John D.B. Featherstone
Mark Urata
Beth Pyatak

Poster Category Awards

Faculty and Student Abstracts

Letter from the Editors

Student Research Group

Schedule of Events
Dr. Glenn Clark received his DDS degree from the UCLA School of Dentistry in 1980. He is currently a Professor at the Herman Ostrow School of Dentistry and Director of the master’s degree program in Orofacial Pain and Oral Medicine at USC.

BACKGROUND

The dental field is continually being revolutionized with new materials, tools, and technology. Dr. Glenn Clark is bringing that ingenuity to dental education. Dr. Clark is a Professor at the Herman Ostrow School of Dentistry and Director of the master’s degree program in Orofacial Pain and Oral Medicine at USC. The Orofacial Pain and Oral Medicine program is an interactive, hybrid online-in-person residency program. With 70 dentists currently enrolled, it is the largest program of its kind. A virtual patient system was created by Dr. Clark and Dr. Luciano Nocera from the Viterbi School of Engineering, and it is used in this program both for the purposes of training and as a final competency examination of the residents’ knowledge.

HOW IT STARTED

Dr. Clark received his DDS degree from the UCLA School of Dentistry and then attended the University of Rochester, where he received a master’s degree in dental research. He quickly found that passion for teaching after becoming a faculty member at UCLA. After teaching for over 27 years, he finally found his way to USC, where he was hired to create an advanced program in orofacial pain and mucosal diseases.

HOW IT WORKS

As mentioned above, the program uses anonymized data based on patients who were treated at the USC Orofacial Pain and Oral Medicine Clinic. Currently, the virtual patient database contains over 120 cases with pathologies ranging from bone pathology, oral mucosal lesions, temporomandibular disorders, headaches, and neuropathies. The students are also provided with the associated medical history questionnaire data before the “interview” process begins. Through this program, both current dental students and practicing dentists are able to benefit by learning how to treat patients based on real-life cases and scenarios. They learn the thought process necessary in order to properly diagnose patients with challenging or unusual pathologies.

USC STUDENTS

In order to improve and develop the abilities of dental students to make clinical decisions, Dr. Clark requires that fourth-year dental students take his “DDS Detective” course as a one-week rotation. The rotation is set up as a game in order to better engage the students. “Considering the availability of online resources, games are becoming an essential tool for educators,” Dr. Clark states. “Some of the benefits of including virtual learning are increased retention and improved skill transfer to real-life situations.” The program is divided into four sections: case selection, patient interview, decisions, and feedback. After the student reviews the medical history questionnaire, he or she is presented with a picture for example, of a lesion or some sort of asymmetry. From there the students can inquire further about their patient from a bank of about 400 different questions. Examples of questions include “What is your chief complaint?”, “How long have you had this problem?”, “How severe is the pain?”, and “What medications are you taking?” Each question is followed by a response that leads the student to ask a new, relevant question.

After this question-and-answer session, students continue to the decision panel where they are able to order diagnostic tests. From this point on, students must make decisions in a linear fashion with no possibility of backtracking. This is where the students can gain or lose points. For example, if a biopsy is requested as a test, but the patient does not present with a lesion, this would result in a deduction of points. In order to complete the week-long course, students have to complete four cases and pass three. The goal of the game is to correctly diagnose the patient and prescribe the right medications, while asking questions and gathering cues in a logical and systematic way.

RESIDENCY PROGRAM

As for life after dental school, Dr. Clark noticed that in order for practicing dentists to further their knowledge and keep up with new technologies, continuing education courses were the only outlet. He felt this was insufficient. In an effort to bridge the education gap, Dr. Clark developed the master’s degree hybrid online program in Orofacial Pain and Oral Medicine. Each student is required to participate in several two-week “boot camps” where they are trained in a variety of skills. The students are then tested on these skills through an objective structured clinical evaluation (OSCE) in order for students to successfully graduate from this program, they must complete a thesis, put together a portfolio, take 17 courses, watch over 200 hours of lecture, and pass the OSCE.

WHAT’S NEXT

Due to the success of the program, Dr. Clark plans to expand his program with the help of Dr. Mariela Padilla, the Assistant Director of Distance Education. Dr. Clark envisions his programs continuing to grow both in size as well as in quantity. He hopes to add shorter one-year programs such as pain medicine, oral pathology and radiology, and orofacial pain. “I expect to be enrolling a class size every year that will be equal to the conventional advanced dentistry programs here, from about 100 to 150 students a year,” Dr. Clark states. “I think we’ll be a big part of advanced dentistry education. I think we’re changing the face of graduate education in dentistry.”
Dr. Dan Grauer is an Assistant Professor of Clinical Dentistry at the Herman Ostrow School of Dentistry of USC. His orthodontic practice specializes in lingual braces and he serves on the editorial board of professional publications including the American Journal of Orthodontics and Dentofacial Orthopedics.

After completing his bachelor’s degree in dental surgery and master’s degree in orthodontics at the University of Barcelona, Dr. Grauer was still hungry for more wisdom and decided to continue his education in the United States with the help of a prestigious La Caixa Scholarship.

In the U.S., Dr. Grauer began his journey at the University of North Carolina (UNC) at Chapel Hill. He received another master’s degree, specialty certificate in orthodontics, doctor of dental surgery degree, and Ph.D. in Oral Biology. He then completed a post-doctoral fellowship at UNC under the mentorship of Dr. William Proffit, known as the father of contemporary orthodontics.

Dr. Grauer joined the USC School of Dentistry in 2012, where he began teaching in the advanced orthodontic program. Currently, he teaches classes in diagnostic and treatment planning, biomechanics, biomaterialization, interdisciplinary orthodontics, and the application of technology in orthodontics. He also runs an orthodontic practice in Santa Monica, California, and serves on the editorial board of professional publications. He organizes a bi-annual meeting in Barcelona that invites the best professionals from the U.S. and Europe, attracting people from more than 35 countries.

He was elected as an associate editor of the American Journal of Orthodontics and Dentofacial Orthopedics (AJODO) in 2010. His role involves editing a section called “Residents Journal Review.” In this section, residents from 48 accredited orthodontic programs in the U.S. and Canada choose published articles that a normal orthodontist would not have access to. These articles are reviewed and critiqued. Every month, three to eight articles are published in the AJODO.

This way, the residents are published in the journal alongside innovative articles. Dr. Grauer is an expert on lingual braces and has studied their precision and accuracy. With lingual braces, there are five times fewer carious lesions due to decalcification, and if there are white spot lesions, they are ten times smaller. This is because there is more saliva on the lingual side of teeth and lingual braces are better adapted to the surface of the enamel in the United States with the help of a prestigious La Caixa Scholarship.

In traditional orthodontics, the size of the brackets and the shape of the wires are based on average values used by 95 to 98 percent of orthodontists. Today, Dr. Grauer has developed facially driven computer-guided orthodontics, which focuses on the face along with the positioning of the teeth to improve the overall smile. He explains how this new method works by first taking a three-dimensional radiograph of the head and photos at different angles to determine where the teeth are located relative to the lips and face. Then, the positions of the teeth are prepared so that the target smile is visualized relative to the lips and face. The other important component is a customized appliance, where there is a computer process that models the target result and presents a mock-up. Unlike the conventional treatment plan, a bracket is customized and fabricated for every tooth with three-dimensional printers. The wires are made based on the shape of the patient’s jaw and the shape of the dental arches that will be achieved. Ultimately, this computer-guided process begins with the end goal in mind and produces clear cut results. It also decreases treatment time by up to one third.

Dr. Grauer also performs research in interdisciplinary treatment planning, which involves orthognathic surgery, the position of the condyles, and changes in the face. Just recently, Dr. Paula Zabalegui, a resident working with Dr. Grauer on his latest project, which looked at the difference in condyle positioning before and after orthognathic surgery, was awarded the Advanced Orthodontic Research Award and the American Association of Orthodontists Graber Award.

When orthognathic surgery is performed on a patient, the positions of the condyles relative to the glenoid fossa should not be altered. Dr. Grauer and his team have therefore developed a method to register and superimpose the condyles based on the position of the glenoid fossa between two time points, before surgery and after surgery. They can now measure, in three dimensions the displacement and rotation of the condyles. There are currently a sample of 35 patients and their data is reported in the American Journal of Orthodontics and Dentofacial Orthopedics.

As a practitioner, educator, and researcher, Dr. Grauer is an innovator and influence in his field of orthodontics.
The field of oral and maxillofacial surgery has evolved in scope to traverse both medical and dental specialties. While grounded in a strong foundation of dentoalveolar principles, oral surgeons now perform facial reconstruction, cosmetic surgery, head and neck dissections, and other maxillofacial procedures. Drawing from principles of orthotony and plastic surgery, oral surgery demands focus, precision, and innovative thinking. At the forefront of this field and upholding Hammoudeh’s interest in pursuing post-doctoral craniofacial training. His desire to have a broad-based understanding provided stark contrast to the didactic education he was receiving in dental school and sparked his interest in craniofacial surgery more generally.

Perhaps it was his early exposure to the unusual cases that crossed over into ENT surgical specialties that spurred Dr. Hammoudeh’s interest in pursuing post-doctoral craniofacial training. His desire to have a broad-based understanding provided stark contrast to the didactic education he was receiving in dental school and sparked his interest in craniofacial surgery more generally.

By: Rachna Shenoy ’18 & Iriff Ulep ’19

Hammoudeh craved a challenge. Unstimulated by general dentistry and orthodontics, he turned his focus to orthognathic surgery, a field that involved “incorporating orthodontics into orthognathic surgery,” he says. “I wasn’t interested in orthodontics, but I was interested in the consequences of orthodontics.” Hammoudeh craved a challenge. Unstimulated by general dentistry and orthodontics, he turned his focus to orthognathic surgery, a field that involved “incorporating orthodontics into orthognathic surgery,” he says. “I wasn’t interested in orthodontics, but I was interested in the consequences of orthodontics.”

Dr. Hammoudeh, a graduate of both Northwestern Dental and Medical School, received extensive training in both clinical oral and maxillofacial surgery as well as plastic surgery. Following dental school, Dr. Hammoudeh trained at Rush Presbyterian Hospital and Northwestern Memorial Hospital, completing surgical internships in oral surgery and general surgery. He then continued his general surgery prerequisites at the prestigious Massachusetts General Hospital (MGH) and subsequently finished an oral and maxillofacial residency through MGH’s associated Harvard program. Desiring further training in plastic and reconstructive surgery, Dr. Hammoudeh completed formal plastic and reconstructive surgery training at the University of Miami/Jackson Memorial Hospital. Taking a special interest in pediatric craniofacial surgery, he completed a fellowship at the Children’s Hospital of Los Angeles (CHLA) in pediatric plastic and craniofacial surgery. This one-year fellowship is what brought Dr. Hammoudeh to the Los Angeles area and to the University of Southern California.

It is no wonder that someone with such impressive training and extensive knowledge of the wide range of specialties constellating around oral surgery would land at CHLA, which houses one of the nation’s premier craniofacial teams. Still, Dr. Hammoudeh insists that he has taken a roundabout path to practicing in pediatric craniofacial surgery, stating that he was constantly searching for his place in such a vast field. He says, “I was not interested in orthodontics, but I was interested in the consequences of orthodontics.”

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Dr. Hammoudeh describes being interested in complex and intricate cases that were out of scope of the traditionally trained oral surgeon. Throughout his training he pushed the boundaries of oral surgery. “I was interested in plastic surgery, which is a specialty of medicine, knowing I was going to circle back around and do craniofacial,” he says. “I didn’t really do plastic surgery to really be doing a lot of cosmetic surgery. I did it because I wanted to do craniofacial surgery and to do the full scope of craniofacial surgery. It’s hard to do it as an oral surgeon alone. It’s not that it’s impossible, it’s just a little bit difficult.”

What many view as impossible is truly “just a little bit more difficult” to Dr. Hammoudeh. This also characterizes his innovative research. He states, “I got into clinical research by accident. At the time, I was trying to push the envelope and you try to change paradigms.” While training at CHLA, Dr. Hammoudeh was involved in many cases involving children born with craniofacial abnormalities and specifically cleft lip and palate. This condition, caused by an incomplete fusion of the nasal and internal maxillary processes, is typically treated in the United States with numerous corrective surgeries and extensive orthodontic treatment aimed at birth through adolescence to restore occlusion, function, phonetics, and esthetics of the lips and palate. For children born with cleft lip and palate who are treated with a surgical team such as CHLA, a team consisting of oral surgeons, plastic surgeons, prosthodontists, orthodontists, and speech therapists plans appropriate treatment beginning in early infancy. The traditional timeline to the defect repairs begins with the first surgery between the ages of three and six months. Prior to the first surgery, a process called nasoalveolar moulding, or NAM, is often undertaken. In NAM, the child wears a device that draws the width of the cleft by constraining the alveolus and elevating the nose, improving the eventual surgical outcome. Until surgical repair is completed, the child’s ability to feed is of primary concern, and the extra care required by the child may be on the parents. It is a difficult time for many families.

Always thinking critically and pushing the standard of care, Dr. Hammoudeh sought to find a solution for the delay in surgical treatment of children with cleft lip and palate. He states, “you’re born with this deformity and you have to wait five to six months. What can we do differently earlier?” As an innovator and engineer of pragmatic solutions, he designed a protocol, obtained institutional Review Board approval to conduct a study, and established clinical trials. To date, he has conducted fifty cases of cleft lip repair at two weeks of life. The result, he says, is monumental—impossible on both the child and the family. He recalls families who came to him for the first time to take their child back to surgery but remain from doing so due to the constant questioning about their child’s condition. Dr. Hammoudeh comments, “These parents love their child the same as kids that are born without cleft lip/cleft palate, but there is that burden that they carry.” By eliminating five months of waiting for cleft lip and palate repair, Dr. Hammoudeh and his team have provided a safe and effective acceleration of the timeline for a surgery that transforms a young child’s life.

When asked about his motivation for entering clinical research, Dr. Hammoudeh calls it “the impact factor.” He states that he approaches research on a case by case basis, witnessing complicated treatments in the hospital and attempting to find a more efficient and effective solution. His pragmatic style of thinking has led to transformations in treatments for children with Pierre Robin syndrome, a congenital abnormality that results in retrognathia, cleft palate, and airway obstruction. He conducts distraction procedures that include osteotomy followed by advancement of the jaw, thus avoiding a tracheostomy and reducing morbidity and mortality by about fifteen to twenty percent. Dr. Hammoudeh believes that for him, the “impact factor” is much higher in children. Clinical research has allowed him to change treatment paradigms and have an impact on a child’s care immediately. This impact factor, combined with the desire to improve care for children, technical ability, and perseverance, that has spurred Dr. Hammoudeh to professional success.

Such an accomplished and highly trained surgeon must have an array of professional mentors, but when asked about his most impactful experience, Dr. Hammoudeh surprisingly cites college athletics as his biggest inspiration. He shares that he attended college on a football scholarship and originally aspired to play in the NFL. He believes his greatest influences were his five years of college training, being part of a team, and being pushed physically and mentally with high academic and athletic expectations. He calls it “unusual and strange training,” but states, “That tenacity that you would have to excel athletically is the same tenacity needed to excel academically.”

There is a vast amount of truth to what Dr. Hammoudeh says. Searching so many years to find his niche in the surgical field has provided him with a diverse spectrum of influences that have shaped his approach and technique. What began as a journey to find a niche in a complex field culminated in the emergence of an innovative, yet pragmatic surgeon dedicated to meaningfully impacting his patients while advancing the cutting edge of techniques in craniofacial surgery.
Revolutionizing Dental Care for Special Patients

By: Ruhee Jaffer ‘19 & Meha Patel ‘18

Dr. Phuu Han has been deeply invested in the field of dentistry for many years. Her journey began in Yangon, Myanmar where she completed her Bachelor’s Degree in Dental Medicine. Dr. Han then continued her studies in Japan, where she received her Ph.D. from Okayama University. Her doctoral research was in tumor behavior and development, and she wrote her dissertation on “Differential Gene and Protein Expressions in Odontogenic Tumors.” After many years of being engaged in histopathology and research, she wanted to integrate her experience into clinical practice. Her passion for patient care led her to USC, where she completed her residency certificate in Orofacial Pain and Oral Medicine. While completing her degree, she had a deep affinity for treating a range of complex cases from temporomandibular joint disorders to neurofacial developmental issues. She then finished the Advanced Standing Program for International Dentist and received her Doctor of Dental Surgery degree at USC.

The diversity in the fabric of her experience is intertwined with her work in geriatric care, the special patient population, medically complex cases, and interdisciplinary care. Under the auspices of Dr. Roseann Mulligan, she has recently been involved in developing a master’s level geriatric dentistry curriculum. With the continuously aging population, there is a strong impetus to improve geriatric care. This new degree program, offered by USC, is the first of its kind. It is a hybrid program where 80 percent of the coursework is offered via an online platform. This successful program launched in 2012 and graduated its first certificate cohort in 2014, while the first class of the master’s program will graduate in 2017.

Geriatric patients are a particularly disadvantaged population. Clinical research centered towards the geriatric patient is limited in part because the older patient often has multiple compounded medical conditions. In clinical trials of new medications and materials, the patient pool is commonly middle-aged. The interactions between multiple medications and declining health make it difficult to use geriatric subjects in such trials. In addition to all this, convincing geriatric patients to change their behaviors can be extremely difficult. In August 2016, Dr. Han, along with Dr. Mulligan and Dr. Piedad Suarez, published a book chapter addressing this topic titled “Preventive Considerations in Special Care Dentistry” in Prevention Across the Lifespan: A Review of Evidence-Based Interventions for Common Oral Health Conditions. Evidence-based research indicates that an aggressive preventive oral health program is necessary for the young and middle-aged adults. The aim of this program is to alter habits and form healthier behaviors that can serve an individual for a lifetime.

As medicine has advanced, there has been a shift in the type of care that a geriatric patient receives. Geriatric patients are faced with xerostomia (dry mouth), in part due to their sometimes compromised oral health. Prioritizing adequate dental care can help to prevent oral infections and improve the overall health and quality of life for patients with renal failure or transplants. Additionally, in recent years there are new patients living with the human immunodeficiency virus (HIV) than in the past. With the advancements in highly active anti-retroviral therapy, patients with HIV are living longer and healthier lives. Many patients have been on this cocktail therapy for several years. As they ease into their older years, there is a new host of issues that the oral health care provider must recognize and treat. A well-developed oral health program can prevent any adverse sequelae of HIV and aging.

Dr. Han has been instrumental in another forum as well - the Interprofessional Education (IPE) program. Dr. Han, along with Dr. Jeremy Teoh, has dedicated her time to promoting integrative health care via IPE seminars. Currently, the educational system is extremely segregated. The interaction of various healthcare professionals tending to a single patient is very limited. By offering holistic patient-centered care, the outcomes and health of a patient can be significantly improved. The IPE sessions have been very well received. Some of the programs encompassed under the Interprofessional initiative include the Interprofessional Geriatric Curriculum, ProActive Health Fair, and Interprofessional Day. Dr. Han has played a pivotal role in the foundation of the IPE curriculum. The IPE sessions are offered to select students from across the healthcare spectrum. During Interprofessional Day, a panel of speakers from a variety of healthcare professions are invited to discuss their scope of practice and role as part of a health care team, and how collaborative care can be applied in the clinical setting. The goal of these sessions is to foster discussion among students from different disciplines and help to provide them with a basic understanding of the role of their colleagues.

Due to the success of these programs, Dr. Teoh received a grant to further this mission. A small pilot program was launched with twenty geriatric dental students who had the opportunity to interact with health professionals from seven different professions. All the participating students and residents focus on longitudinal patient care (over a one-year period) at the Tres Lomas retirement community. The ultimate mission is to help students from across the healthcare spectrum utilize each other to provide the most optimal patient care.

Dr. Han has been heavily involved with a multitude of other programs offered at USC. Some of these include the Children’s Health and Maintenance Program (CHAMP), County Geriatrics Clinics and the Hollenbeck Nursing Facility. Dr. Han has a broad range of interests focused on improving patient care for marginalized population groups and is certainly revolutionizing the approach to patient-centered care.
Dr. Huang also helped create a curriculum and clinic, but also with a month-long externship in Boston. Dr. Huang volunteered at Mercy Health during undergraduate studies at the University of Georgia. Seeing the need for oral healthcare in the population surrounding the university, Dr. Huang volunteered at Mercy Health Clinic in Athens, Georgia to help deliver care to the underserved. These volunteer experiences drew her into the profession of dentistry because she found them to be especially rewarding.

Dr. Huang didn’t truly know how strongly she felt about pediatric dentistry until she treated children in dental school. At Harvard, Dr. Huang had a strong exposure to pediatric dentistry not only within the dental school curriculum and clinic, but also with a month-long externship at Boston Children’s Hospital and at several monthly volunteer clinics serving the indigent pediatric population in Boston. Dr. Huang also helped create a curriculum along with some of her medical and dental colleagues on various teen health topics; she administered these weekly lectures to at-risk middle school students for a semester.

Her experiences in dental school were well rounded in several facets of treating the pediatric patient. She loves kids and clearly has the energy required to treat this patient population. Dr. Huang enjoys the breadth of pediatric dentistry and how the field is only age-defined and not procedure-defined. She also notes that the specialty requires clinicians to constantly be working at high efficiency.

Dr. Huang states that a key component of pediatric dentistry is understanding and being able to implement behavior management techniques effectively and safely. Several factors are key in administering proper care—not only for the safety of the patient and staff, but also for the mental well-being of the patient. When treating a young child, positive experiences are instrumental in maintaining a positive outlook that the young patient will carry in regards to oral health throughout life. This was one of the most important lessons that Dr. Huang learned throughout residency and continues to learn with each patient in practice.

Dr. Huang began dipping her toe in research during college, where she worked for two years in a genetics lab under the guidance of Dr. Daniel Promislow. This bench top research gave her the opportunity to learn the fundamentals and inspired her to continue with research, both during dental school and beyond. While at Harvard, Dr. Huang traveled to South Africa for eight weeks, where she investigated the system of nutritional education in the Port Elizabeth Health Complex hospitals by examining the disparity in nutrition knowledge between clinicians and patients with HIV/AIDS. Her study also assessed the capability of patients to adhere to nutritional guidelines and their food security. To optimize the quality of this investigation, Dr. Huang planned and worked tirelessly for an entire year prior to traveling to South Africa.

During her pediatric dentistry residency, Dr. Huang conducted research with Dr. Thomas Tanbonliong on the post-discharge adverse events following oral sedation in the pediatric dental patient in hopes of better educating caregivers. Dr. Huang believes that sedation is an important issue for all dentists treating the pediatric patient. Pediatric residents at USC are trained in several different methods of sedation and develop a thorough knowledge base on how to sedate safely. Currently, Dr. Huang and Dr. Tanbonliong are working with pediatric residents on a follow up study to her original investigation on oral sedation, but this time they are using two different sedation regimens for comparison.

Another study led by Dr. Huang with a previous pediatric resident investigated the level of oral health knowledge in nurses. Stressing the importance of educating nurses about oral health and prevention practices because nurses are often the first point of contact with pediatric patients and their parents, and as a result nurses are a great resource in educating them. Currently, this study is also going further data analysis in preparation for publication.

Dr. Huang states that her two years of training at USC and CHLA were invaluable for building the foundation for a career in pediatric dentistry. She also recommends dental students to gain as much exposure to pediatric dentistry as possible. Whether in the USC Pediatric Clinic seeing extra patients or volunteering in outreach rotations and clinics available to USC students, these experiences help students to find and explore their true interests while gaining expertise in their prospective field.

For dental students and practicing dentists who are interested in pediatric dentistry, Dr. Huang highly recommends further training through a pediatric residency. The skills gained from either a two- or three-year program lay a superb foundation for a career in pediatric dentistry. She also recommends dental students to gain as much exposure to pediatric dentistry as possible. Whether in the USC Pediatric Clinic seeing extra patients or volunteering in outreach rotations and clinics available to USC students, these experiences help students to find and explore their true interests while gaining expertise in their prospective field.
Dr. Kar’s interest in periodontology was triggered in his second year of dental school in Iran when he would assist his father, a practicing general dentist, chairside. He noticed a lot of patients had periodontitis and was left awestruck by the disease. He noticed patients with periodontitis would benefit from early periodontal treatment. This realization reinforced his curiosity in finding a solution as to why this condition exists and why it affects different people differently.

His interest in research began while he pursued training at USC, when he observed that how some young patients who suffered from aggressive periodontitis would benefit from early periodontal treatment. This realization was enough to help keep his curiosity alive in finding a solution as to why this condition exists and why it affects different people differently.

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Despite the myriad challenges that comes with educating dental students and conducting research, Dr. Thomas Levy, an Associate Professor of Clinical Dentistry and the Director of the Advanced Endodontics Clinic at the Herman Ostrow School of Dentistry of USC, is revitalized by these two fields. Dr. Levy received his DDS degree in 1975 and his Master’s in Oral Biology in 1978 from the University of Pacific. After graduating with an endodontics certificate, he took over his father’s clinic and practiced as an endodontist for twenty-three years. However, even after taking on a partner, Dr. Levy grew weary of working as a specialist and made an unconventional career choice. He diverted from the path of dentistry and pursued a career as a car salesman. While he was working at car dealerships, Dr. Levy started as a part-time volunteer instructor for the Advanced Standing Program for Professional Dentists (ASPID), which then led to a full-time position. His volunteering reminded him of his interest in dentistry and led to an unwavering stewardship of the educational needs of the students of USC. Dr. Levy was one of only a handful of ASPID volunteers to work full-time, and his dedication to his students continued as he transitioned into a graduate and undergraduate instructor.

Adding to his personal enthusiasm for teaching, Dr. Levy has also had an inclination towards research. He has been part of many research endeavors, such as bone grafting research for a company in El Salvador and researching a device that diagnoses different types of tooth fractures. One of his published works, featured in the Journal of Endodontics, explores the bacterial DNA present in periapical lesions of symptomatic teeth. He is also currently working on a project that aims to compare the healing rate of the dental pulp of patients infected with HIV who are on anti-viral medications with those who are not. This interest in HIV and oral health stemmed from the fact that Ostrow’s endodontic clinic sees over 400 HIV infected patients a year. More than 100 HIV-positive patients have been tested so far, and this will be one of the first dental studies that utilizes such a large sample size. According to Dr. Levy, “The ultimate goal of this project is to understand the effect of an anti-viral medication on dental bacteria and biofilm.” This study may even challenge the standard dental procedures for HIV-infected patients and lead to new recommendations that could improve the treatment of HIV patients on anti-viral medications.

Furthermore, Dr. Levy is deeply invested in and enthusiastic about the education of dental students. Currently, he is investigating new methods for better instructing dental students in the art of diagnostics. The Avatar Project, currently in its infancy, is a dynamic program that allows students to practice diagnosing different types of patients. Dr. Levy believes that students will feel more confident when they encounter different types of patients after graduation, thanks to the exposure they will encounter during the Avatar Project. Students will be able to internalize these experiences and say, “I have seen this and have been with this type of patient before. I know how to handle this.” The Sociology Department at USC is developing the Avatar software and tailoring the dialogue in the situation presented by the software to the dental field. “We want to teach the dentist how to interact with the patient and put [the students] in different situations that we can’t do in lectures,” says Dr. Levy. Avatar will be made easily accessible to students through Blackboard – an online course management system commonly used at USC. In addition, every student will have their own personal avatar. This will allow students to gain even more experience before they graduate. The conception of the Avatar Project stemmed from the concept of the “flipped classroom”. This method of education replaces long and sometimes tedious lectures with short 10-15 minute presentations that introduce new concepts, which students view on Blackboard prior to discussing the materials in the classroom. Another component of this educational style is an emphasis on learning in group settings. While in these groups, the students will simulate performing certain procedures on each other. This allows the students to experience what patients feel “The students seem to enjoy it more,” Dr. Levy believes. Also, another avenue that caters to the education of millenniums is the use of an application called “Kahoot,” which allows professors to modify lectures based on student performance in quizzes given throughout the lecture.

In addition to his research and teaching ventures, Dr. Levy is deeply engaged in community outreach. In 2012, the California Dental Association (CDA) honored Dr. Levy with its Dr. Arthur A. Dugoni Faculty Award. This award was given to applaud Dr. Levy for what the CDA explains as “exceptional leadership, innovation, collaboration, compassion, philanthropic spirit and integrity in dental education.” He is a leader in the Department of Veterans Affairs’ Stand Down, which provides dental services to homeless veterans, and he also personally donates to the American College of Endodontics’ Endowment Fund and USC’s Give Back Fund and the American College of Endodontics’ Endowment Fund and USC’s Give Back Fund and the American College of Endodontics’ Endowment Fund and USC’s Give Back Fund. Dr. Levy is a distinguished researcher, with a passion for educating the next generation of healthcare providers. Moreover, he is equally committed to his own continuing education, and plans to pursue a master’s degree in geriatrics in the next few years. His dedication to the betterment of the education system is clear through his innovative research in adapting the education style towards the mindset of his students. Although most would be intimidated by the amount of work that needs to be accomplished as an educator and a researcher, he finds great enjoyment and energy in these endeavors.
Dr. Pascal Magne, an Associate Professor and the Don and Sybil Harrington Foundation Chair in Esthetic Dentistry at the Herman Ostrow School of Dentistry of USC, serves as the Director for USC’s Dental Morphology, Function, and Esthetics (DMEF) module. Dr. Magne has had an illustrious career as a dental clinician, researcher, author, and professor in esthetic and adhesive dentistry. His accomplishments in the field of dentistry are remarkable and deserve recognition. Dr. Magne was asked to join as a faculty of the Herman Ostrow School of Dentistry of USC in 2002 and has since helped develop a profound restorative curriculum that embraces the advancements in restorative dentistry. His unique and genuine passion for his work is undeniably inspiring in each and every interaction.

Born in the small city of La Chaux-de-Fonds in Switzerland, Dr. Magne spent a majority of his academic years in Geneva, Switzerland, where he began his career as a skilled dental clinician and renowned researcher. Wanting to further his education in the field of dentistry, he decided to pursue a Ph.D. He owes much of his passion for luting procedures and adhesive dentistry to the years he spent on this educational path. In 2002, he released a book entitled Bonded Porcelain Restorations in the Anterior Dentition. Dr. Magne’s future lies in a continuing passion for research, educating young minds in the field of adhesive and esthetic dentistry, and continuing clinical work.

Dr. Magne’s unique curiosity is contagious, and many colleagues have joined his team to continue igniting their spark of inspiration. When asked about what he believes lies in the future of restorative dentistry, he offered a solution that brings us back to the core of dentistry, the natural tooth. Dr. Magne believes that one day we will “capture the true essence of biomimetics by restoring teeth using real enamel and dentin [through stem cell production or through the utilization of extracted un-restored teeth].”

Dr. Magne’s passion for research began in 1996 when he decided to focus on adhesive dentistry and biomimetics. He describes this idea of biomimetics as an approach to bonding that utilizes the best materials to mimic the natural tooth—a perfectly designed structure. Twenty years ago he began working with various types of ceramic, an excellent restorative material that has impeccable esthetics when utilized by a skilled clinician. He researched the benefits of ceramics in comparison to those of composite resin materials. Over the course of the last 20 years, materials have changed and so has Dr. Magne’s research. He has learned to adapt along with this dynamic field of dentistry, and has encouraged the systematic evaluation of new technologies presented to dental professionals. Dr. Magne’s research has made him an expert on the materials that are available for adhesive and esthetic dentistry. His most recent surge in research has been in composite resin materials and especially in the use of CAD/CAM technology, which he refers to as the “smartphone of the dentist”—a device that will be readily used by the next generation of clinicians.

Lately, Dr. Magne has focused his attention on determining how to optimize bonding by way of immediate dentin sealing (IDS). Dr. Magne expresses great pride in the success of utilizing the correct IDS technique. At USC, students are taught innovative and proven techniques thanks to Dr. Magne’s pioneering research. He notes, “we promote a thick layer [of a superior material] to have a protected and completely closed-loop servohydraulic fatigue test operations of restorations carried out in an artificial mouth using a multiaxial closed-loop servohydraulic fatigue test operations for the evaluation of the bond strength.”

Working with his hands and utilizing his creativity spoke directly to Dr. Magne’s imagination. During this time, his brother, Michel Magne, worked for the same dentist. Today, Michel is a renowned master ceramist and expert in the art and science of esthetic dentistry. The two brothers continue to build on each other’s strengths and creative spirits in the field.

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His research has evaluated the use of IDS in endodontically treated teeth, direct pulp capping and direct composite restorations. Moreover, the success of delayed IDS was studied and proven. Dr. Magne’s findings were published in the Journal of Prosthetic Dentistry.

Dr. Magne conducts various studies with visiting scholars from all around the globe and is currently conducting research with Luciana Mara Soares. Together, their research is testing the difference in strength between large MOD inlays created by the Cerec CAD/CAM technology and those that are hand-crafted. Thus far, CAD/CAM designs have unsurprisingly proven their worth. Utilizing the IDS process in addition to the CAD/CAM system, it is now possible to create restorations that will not experience adhesive failures even at extremely high loads.
For the occupational therapy profession, 2017 is a truly special year. It was at a 1917 meeting in upstate New York that the profession was formally established by six individuals with the shared purpose “to study and advance curative occupations for invalids and convalescents.” The nationwide occupational therapy community joyfully celebrates this centennial anniversary milestone and reflects on a century rich with history, growth and impact.

2017 also marks the 75th anniversary of what is now known as the USC Chan Division of Occupational Science and Occupational Therapy. In 1942, USC began admitting students to courses in a new bachelor’s degree program directed by renowned ceramic artist Glen Lukens and occupational therapy coordinator Mary L. Abbey, OTR within the College of Architecture and Fine Arts. With the country fully engaged in the Second World War, the Los Angeles Times noted that these Trojans would “do the many things occupational therapy makes possible for men who have suffered through service in war or industry.”

During the past 75 years, that single program has grown exponentially and evolved into the USC Chan Division, which has been proudly aligned with the Herman Ostrow School of Dentistry of USC since 2006. Today the division offers academic programs that educate hundreds of students from the undergraduate to postdoctoral levels, provides clinical services to tens of thousands of patients annually, and operates a research enterprise unrivaled by any similar educational program in the world.

Research at USC Chan is designed to systematize knowledge about “occupation” — defined as meaningful daily activities ranging from the ordinary to the extraordinary — and its influence upon health and well-being. USC Chan faculty members have collectively secured more than $25 million of federal funding since 1994, and are internationally recognized for their excellence and innovation, sustained acquisition of extramural support and leadership in implementing interdisciplinary inquiry.

Understanding “real people” in the context of their “real lives” requires conceptual and methodological expertise that has been, and continues to be, developed through scholarship in the fields of occupational science and occupational therapy. With more than $56 million in current active grant funding, USC Chan faculty members are pursuing knowledge with relevant outcomes for real-world interventions that improve human health, quality of life and well-being.

Research Day 2017 keynote speaker Beth Pyatak, PhD, OTR/L, CDE. Pyatak earned her PhD in occupational science from USC in 2010 and joined the faculty as an assistant professor in 2011. Her primary research interests lie at the intersection of chronic care management, occupational engagement and health and well-being among individuals with chronic illness and/or disability. She is also a registered and licensed occupational therapist and a Certified Diabetes Educator.

Pyatak is currently the Principal Investigator of a NIH-funded, three-year mentored career development award to pilot test an innovative intervention entitled Resilient, Empowered, Active Living with Diabetes (REAL), which aims to improve the clinical and psychosocial well-being of underserved minority young adults with poorly controlled diabetes (NIH #K01DK099202). Funded by the NIH/National Institute of Diabetes and Digestive and Kidney Diseases, this individually tailored, community-based intervention merges findings of an in-depth needs assessment, an evidence-based occupational therapy intervention framework (Lifestyle Redesign) and evidence-based diabetes self-management strategies. Pyatak’s earlier proof of concept study demonstrated that the REAL intervention is feasible to implement, well-accepted by young adults with type 1 diabetes and type 2 diabetes, and has potential to produce positive changes in diabetes self-care and glycemic control.

The study randomized 81 young adults with diabetes to receive either the six month REAL intervention or an attention control condition. Blinded data collectors evaluated glycemic control, diabetes self-care behaviors and quality of life outcomes, as well as potential intervention mediators, before and after the six-month intervention. Additionally, a rigorous process evaluation was employed to evaluate intervention implementation and study procedures. It is anticipated that findings from Pyatak’s pilot study will be used to inform a large-scale randomized controlled trial of the REAL intervention as well as provide evidence of the effectiveness of occupational therapy services in chronic disease management.

Pyatak’s project mentors include Anne Peters, MD, CDE, professor of clinical medicine at the Keck School of Medicine of USC and the director of the USC Clinical Diabetes Program; Donna Spruijt-Metz, PhD, research professor of psychology at the Dornsife College of Letters, Arts and Sciences and of preventive medicine at the Keck School and the director of the USC mHealth Collaboratory at the Dornsife Center for Economic and Social Research; and Robin Whittemore, PhD, APRN, FAAN, professor of nursing and the PhD program director at the Yale School of Nursing.

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Much of Dr. Paine’s work revolves around manipulating genes in mice that are crucial in enamel formation, whether it is knocking genes out, overexpressing them, or silencing them. What is fascinating about enamel-forming cells, or ameloblasts, is that they are the only epithelial cells in our bodies that produce mineralized tissues in non-pathological conditions. In addition, ameloblasts occupy a fairly unique space in cell biology because they are capable of transitioning from producing structural proteins, such as enamelin and amelogenin, to secretory processes such as those involved in amelogeninogenesis imperfecta (AI). AI is a genetic disorder that affects 1 in 14,000 people in the United States every year. Patients suffering from AI may experience hypoplasia, or pitting, of enamel, resulting in teeth that are thin, discolored, pitted, and readily chipped away. Ultimately, AI left unattended leaves teeth extremely susceptible to accelerated decay and infection. There are four types of AI, with different genetic causes. The mode of inheritance can be autosomal dominant, autosomal recessive, or X-linked, with each type weakening the enamel in a particular way.

Some of Dr. Paine’s early research dealt specifically with ameloblastin, an enamel matrix protein (also known by the names enamelin and sheathelin) encoded by the gene Ambn. By overexpressing Ambn in mice, Dr. Paine was able to provide in vivo evidence demonstrating that ameloblastin overexpression is linked to nanoscale malformation of enamel rods. This study provided promising links between ameloblastin and its role in enamel crystal formation as well as in AI. The family of genes that governs the architecture of enamel crystals is a vast and sprawling one, and Dr. Paine has led research exploring the roles of various other members of this family, including dentin sialophosphoprotein (DSPP), DSPP codes for the expression of dentin sialoprotein (DSP) and is an important player in the creation of the region of enamel that coats the dentin-enamel junction. This region of enamel also happens to be tougher than the rest of the enamel surrounding it. While both DSP and DSPP are essential for normal enamel formation, Dr. Paine found that expression of DSP in the enamel organs of mice resulted in significantly harder enamel while overexpression of DSP resulted in the development of more fragile and pitted enamel, which might have some promising implications for the protective properties of DSF.

More recently, Dr. Paine has studied the roles of ion channels and pH conditions in enamel production. The formation of hydroxyapatite crystals releases protons into the enamel environment, causing the space to rapidly become highly acidic. What is interesting is that the body uses to combat this sudden rise in acidity, Dr. Paine was particularly interested in a sodiomotive H+ pump, NCBE, which resides in the dental epithelium and could potentially be responsible for neutralizing the acidity through the buffering actions of AH +. NCBE is the gene that codes for NCBE1, and mutations in this gene result in defects in the developing enamel layer. By overexpressing NCBE1 in mice, Dr. Paine found that overexpression of NCBE resulted in the development of more fragile and pitted enamel, which might have some promising implications for the protective properties of DSF.

Currently there exists no definitive cure for patients suffering from AI. Patients can seek a range of treatment options, and the combination of both preventive and restorative measures are critical to preserving tooth functionality. Treatment plans can include anything from sealants and bonding to full crowns and implants. Often the comprehensive treatment of a patient with AI can involve the integratred efforts of multiple dental specialties, including general and pediatric dentistry, prosthodontics, orthodontics, and oral surgery. Hopefully, further research in this field of enamel formation will ultimately lead to even more effective forms of care in serving patients with AI.

When he is not involved with research, Dr. Paine gives lectures to Ph.D. and Master’s degree students and guides second- and third-year dental students in problem-based learning sessions. Furthermore, Dr. Paine’s work makes innovation and research in the Craniofacial Biology program at USC possible, as he has a vital role in procuring funding for doctoral and postdoctoral students conducting studies in oral and craniofacial health. In 2011, Dr. Paine was a recipient of the prestigious Top/Ro training grant offered by the National Institute for Dental and Craniofacial Research. The grant provided $2 million to support students in their research over a five-year time span, and Dr. Paine has recently renewed renewed support to cover the next five years. Such grants demand incredible investments of time and energy, from preparing the proposal to continued administration and reporting of progress without the period of support, and Dr. Paine spent 6-8 months working on his most recent submission. For Dr. Paine, it is about more than just being able to finance studies in oral health. He states, “I don’t just want to fund research on dental problems, I want to be involved with training the next generation of scientists to meet the needs of the dental community.” Dr. Paine was recently named a Fellow of the American Association for the Advancement of Science (AAAS) in recognition of his tremendous contributions to the arena of enamel research.
A Journey Towards Biomimetic Dentistry

BY: AMNA IRMAN ’18 & MONIKA KUNDER ’18

Dr. Jin-Ho Phark, an Assistant Professor of Clinical Dentistry at the Herman Ostrow School of Dentistry of USC, graduated with a DDS degree from Charité, Humboldt University in Berlin, Germany in 2003. He engaged in clinical investigations studying the periodontium, specifically the gingival architecture in pediatric patients. Following graduation, he continued to work at the dental school as a faculty member and a researcher, while also working in private practice. During this time, he conducted research including a clinical comparative study of over-the-counter, in-home teeth bleaching products and comparative study of over-the-counter, composite shortly after polymerization. His study emphasizes the importance of the complete hardening of the restoration as well as patient sensitivity. This study helps to evaluate the durability of restorative materials and in doing so, sheds light on each step in the breakdown process and how it can be prevented.

Phark is also involved in research that is looking into overcoming polymerization shrinkage as well as the hardening behavior of composite after the polymerization process. His study emphasizes the importance of the complete hardening of composite shortly after polymerization. Another project Dr. Phark is working on is testing the bond strength between dentin and silver diamine fluoride (SDF), a solution that can help arrest active caries. SDF is non-invasive and can help patients who are not able to be treated frequently in a proper dental setting, such as elderly and pediatric patients. Recently, Dr. Phark and his team have been using SDF on pediatric and special patients, and it has proven to do a remarkable job in arresting caries when supported by adequate oral hygiene.

As an educator and researcher, Dr. Phark has been awarded the International Association for Dental Research’s Arthur Frechette Award in 2009 and was named one of ten professors changing dental technology in 2015 by Medical Technology Schools. When giving advice to his students, Dr. Phark urges them to “Always stay curious and try to understand what you do and why you do a particular step.” He believes this is the driving force towards learning and in continuing to push the boundaries of dentistry.
A trip to the physical therapist could soon feel a bit more like a trip to the arcade, thanks to a new multidisciplinary study being conducted at USC.

James Finley and Beth Fisher of the USC Division of Biokinesiology and Physical Therapy and Mariannita Gotsis of the USC School of Cinematic Arts have received a two-year grant from the National Institutes of Health to develop and test a virtual reality (VR)-based program for walking rehabilitation in patients with Parkinson’s disease.

Symptoms such as stiffness, shaking and balance problems can cause people with the degenerative brain disorder to have difficulty walking. Traditional physical therapies have centered around strength training, stretching and movement practice, but it was recently discovered that those strategies may not lead to long-term motor skill retention.

“For a motor-learning perspective, we now know that learning and long-term retention are optimized when the patients have a focus on the movement’s effect on the environment such as ‘step over the obstacle’ rather than on performing the movement itself — ‘flex your hip,’” explained Fisher, professor of clinical physical therapy and director of the Neuromotor Science and Imaging Laboratory.

“With motor rehabilitation, one of the things patients need is lots of repetition,” Finley said. “One of the advantages of doing something like a game is it helps increase motivation to undergo the amount of practice necessary for skill learning.”

During the study’s first phase, the researchers will be designing prototypes of a low-cost, portable gait-training system that can be set up and easily used in the physical therapy office.

“Clinicians have a very limited time with their patients so any hurdles or barriers that are introduced by technology can limit the actual use of that technology in the clinic,” Finley said.

The researchers will then recruit clinicians and their patients to use the system, offering feedback to improve the experience for both the user and the supervising physical therapist.

INTO THE VIRTUAL WORLD

Gotisis and her team of researchers at the USC Creative Media and Behavioral Health Center will design and assess the VR experience — paying close attention to the tiniest of nuances, including sound and haptic feedback — to ensure the most life-like simulations.

“We would like to create a pleasurable, safe and challenging walking virtual reality experience,” Gotisis said. “We will know from participant input if the experience is enjoyable, and our collaborators will help us understand whether the experience is challenging enough to promote neuroplasticity.”

Patients will have the choice of different environments, including a cityscape with high rises, a seaside pier with a Ferris wheel, a park in a path or a visit to Tradewest 3029.

“When it comes to imagining the future of health care, we cannot afford to leave it all to the imagination of a single expert group,” said Gotisis, referring to the power of multidisciplinary approaches to solve some of society’s most vexing problems. “Nobody knows best. We’re all stakeholders in creating new therapies whether they use virtual reality or paper clips and glue.”

Research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health (award number R21 HD088342).
A Korean native, Dr. Jenny Jin Son came to Southern California at the age of nine. After she studied engineering as an undergraduate, she entered a Ph.D. program for chemical engineering. However, two years into the program, she realized a career in engineering was not the path she wanted to take. Instead she received a master’s degree, finished her graduate studies, applied to dental schools, and in 2006 was accepted into the Herman Ostrow School of Dentistry of USC. Upon graduation, Dr. Son immediately enrolled in the school’s advanced prosthodontics residency program. This specialty appealed to her because of the comprehensive learning it encouraged, starting with treatment planning and culminating with the completion of the dental treatment. Inspired by her time as a teaching assistant in the pre-doctorate prosthodontics courses and after enjoying interacting with and helping dental students, Dr. Son decided she wanted to pursue a career as a teacher. Once she completed the advanced prosthodontics program in 2014, she was hired by USC as a full-time faculty member.

The research project Dr. Son took on when she joined the faculty at USC investigates the fit of all-ceramic restorations fabricated by computer-aided design and computer-aided manufacturing (CAD/CAM) technology on stock abutments, in conjunction with Dr. Winston Chee and Dr. Richard Lin. “The accuracy of scan, the fit of the milled restoration to a stock abutment, and the ease of manufacturing are the key factors we are looking into. There are many different systems out there and we want to design and test the machinable ceramic restorations for not only accuracy and strength, but also for what would work in a school environment,” says Dr. Son. In addition, Dr. Son is designing different anti-rotational features in the abutments and is studying how they affect the fit between the abutment and the crown. One distinct advantage of CAD/CAM technology is its reproducibility, with an added advantage of being fabricated in-house. Currently, 3D printing technology is also being explored in terms of provisional restorations. Further research explores what is to be done if a certain implant restorative system is unavailable for fabricating the restoration.

Clinical changes likely will stem from Dr. Son’s research in implants within the next 5 to 10 years. There have been many recent advances in restorative material choices for implants. New materials and new technologies are available to implement these changes. While USC is traditionally known for gold crowns, students are now more exposed to all-ceramic types of restorations, following current trends and advances in dentistry. Both stock and custom abutments can be used to deliver these restorations, and Dr. Son’s research will aid in manufacturing them with predictability and accuracy. If the research is successful and is clinically applicable, CAD/CAM technology could potentially restore implants that would otherwise require a labor-intensive and technologically challenging workflow.

Dr. Son is also involved with research on guided surgery for implants. Guided surgery uses information from the CT scan of a patient, combined with an intraoral scan, to make a surgical stent that is fabricated via CAD/CAM technology by milling or by 3D printing. In Dr. Son’s research, the accuracy of the fit and digital scans, as well as their compatibility with different software, will be measured. This innovative technique has already been implemented in the pre-doctoral implant clinic under the direction of Dr. George Cho, and in the course of this study, many more patients will be able to take advantage of this cutting-edge procedure as the researchers assess the accuracy of different guides.

“I’m also involved with research at Keck Medical Center,” Dr. Son adds. “They’re testing the safety and effectiveness of a medicine on patients with troublesome sialorrhea, involving patients with Parkinson’s disease, stroke, traumatic brain injury, or sialorrhea secondary to oral cancer or medications. For patients with sialorrhea, there is an increased risk for inhaling saliva, food, or fluids into the lungs. Also, skin complications around the mouth, bacterial infection, bad odor, dehydration, and social stigmatization may be problematic for these patients. They are testing medication to stop this, and I’m a subinvestigator as a dentist conducting dental examinations and giving recommendations.” The study is a clinical trial, and the screening phase began in October 2016. Once patients are approved for this clinical trial, they will return to USC about four times a year for a follow-up to assess the oral effects of the medication. Dr. Son notes that one of the differences between interdisciplinary research at Keck and targeted research in dentistry is the applicability and the reality of studying oral health as part of the entire human body. Dentistry is not only about teeth, it is about our health, and research can help a greater number of people, rather than treating just “one tooth at a time.”

“We get to see patients with a variety of systemic medical conditions that make it difficult for them to receive dental treatment,” she explains. Saliva-related research has been conducted in areas such as bacterial detection and its relationship with decay, periodontal disease, and general oral health. Collecting a saliva sample for bacterial load or protein can be as easy as a swab, making saliva a useful medium for study.

Dr. Son spends time teaching and working in the pre-doctoral clinic, the advanced prosthodontics clinic, and the advanced operative clinic. In the pre-doctoral clinic, she is primarily responsible for CAD/CAM restorations and implants, as well as improve the oral health of those with sialorrhea.

She perceives that the main difference between teaching pre-doctoral students and post-graduate students is that the latter are already dentists who are pursuing further education in order to become experts in treating complex cases, and to become leaders, educators, and to engage in other opportunities in their dental career. “When I teach [pre-doctoral] students, I try to remember back to the time when I was a dental student, and I try to go step by step, one by one. With advanced graduate students, we follow standard protocols, but it might be at a more complicated level, and I have more expectations for them to apply their knowledge and skills to come up with creative and innovative solutions.”
In another study, Dr. Zhong was able to identify a single protein that promotes cell differentiation, which revealed a new means of controlling adipogenesis in bone marrow stem cells. In turn, this may have great significance for the structural and functional recovery of the hematopoietic microenvironment after injury due to radiation treatments for cancer and other diseases. He took this a step further and investigated new approaches for targeting the leukemia microenvironment, since current treatments for leukemia are very toxic to the patient and cannot differentiate between cancerous cells and healthy cells. By targeting intercellular communication between leukemia cells and bone marrow stem cells, healthcare professionals can improve clinical outcomes in combination with standard therapy. His most recent review states "the influence of mesenchymal stem cells (MSCs) and the tumor microenvironment (TME) is now widely appreciated in cancer. How ever, distinct MSCs in the TME can come from different origins and exhibit a diversity of anticancer properties. Recently, increasing clinical trials have been performed to study the anticancer properties of MSCs." In addition to their primary effects, MSCs could be employed as carriers of multiple anticancer agents as they can track microscopic tumors and pathologic al lesions without incurring the risk of spreading tumor cells. Through projects like Dr. Zhong's, MSCs could eventually be seen as a new clinical paradigm in anticancer therapies. Ultimately, Dr. Zhong hopes his research on circulating tumor cells will reinvent diagnosis in oncology. Although right now cancer diagnosis is typically conducted through morphologic interpretation, his goal is to shift this standard of practice towards molecular characteristics. Not only would understanding the physiologic features of cancer cells allow doctors to tailor their treatments specific to the responses of tumor cells, but it would also provide practitioners with a prognostic marker.

Single cell molecular profiling also allows for precise studies in gene regulation. In 2015, Dr. Zhong found that changes in tissue elasticity affect cells' gene expression. Cells behave differently and express various genes at different levels in the many microenvironments found in the human body, which can be mimicked in vitro through manipulating the cell culture media.

An example Dr. Zhong gives of inefficient diagnosis is in breast cancer and its metastasis to the brain. "When you find cancer cell in the breast you call it breast cancer, and when you find it in the later stage in the brain, you call it a brain tumor," he explains. "Right now, they are being treated by two different doctors even through cell molecularly they may be the same. If we can go into molecular classification of cancer, not only could we have a more precise diagnosis, we will also have more target drugs to be able to treat patients with."

Another research topic paving the way in oncologic diagnosis is Dr. Zhong's research in using saliva to detect oral cancer. Because the oral cavity is easily accessible and providing salivary samples is much less invasive than blood sampling, the opportunities for early detection in cancer diagnosis could be endless. With such a diverse population of microorganisms and considering its role as a "gatekeeper" for the body, the oral cavity could provide a new, more efficient method for detection.

In addition to conducting research, Dr. Zhong teaches DDS students at the Herman Ostrow School of Dentistry of USC. When asked why he decided to teach problem-based learning in his classes, he states "Teaching is a duty. It is not just about knowing how things work, but you want the society to understand why it is important."

From his ground breaking research to his outlook on teaching, Dr. Zhong is paving the way for the next generation of healthcare professionals. And it is through these accomplishments that he hopes to make an impact on society.
RESEARCH DAY
APRIL 5, 2017

08:00 am
Registration (Presenters and Judges)
Poster Presentations | Judging
General Registration
Lunch
Opening Remarks
Randolph Hall, PhD
Vice President of Research
University of Southern California

09:00 am – 12:00 pm
Poster Presentations Judging
General Registration
Lunch
Opening Remarks
Randolph Hall, PhD
Vice President of Research
University of Southern California

12:30 pm – 12:45 pm
Opening Remarks
Randolph Hall, PhD
Vice President of Research
University of Southern California

12:45 pm – 01:25 pm
Keynote Speaker
John D.B. Featherstone, MSc, PhD
"The Evidence for Caries Management by Risk Assessment (CAMBRA®)
University of California, San Francisco

01:30 pm – 02:10 pm
Keynote Speaker
Mark Urata, MD, DDS
"Craniofacial Surgery: Innovation Leading to Better Answers"
Keck School of Medicine
Herman Ostrow School of Dentistry of USC
Children’s Hospital Los Angeles

02:15 pm – 02:55 pm
Keynote Speaker
Beth Pyatak, PhD, OTR/LM, CDE
"It makes you feel like there’s hope: Insights and findings from the Resilient, Empowered, Active Living (REAL) Diabetes Intervention"
Chan Division of Occupational Science and Occupational Therapy at USC

03:05 pm – 04:00 pm
Poster Viewing
Vendor Fair in Hall of Fame South
Award Presentations
Reception
Vendor Fair Raffle

04:00 pm – 04:30 pm
Vendor Fair in Hall of Fame South
Award Presentations
Reception
Vendor Fair Raffle

04:30 pm – 05:30 pm
Vendor Fair in Hall of Fame South
Award Presentations
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Vendor Fair Raffle

05:00 pm
Vendor Fair in Hall of Fame South
Award Presentations
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Vendor Fair Raffle

05:30 pm – 05:50 pm
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Award Presentations
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06:00 pm
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06:15 pm
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Award Presentations
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07:30 pm – 08:00 pm
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08:00 pm
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09:30 pm – 10:30 pm
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Award Presentations
Reception
Vendor Fair Raffle

KEYNOTE SPEAKERS

JOHN D.B. FEATHERSTONE, MSc, PhD
Dr. John Featherstone is Dean of the School of Dentistry at the University of California, San Francisco (UCSF) and Distinguished Professor of Preventive and Restorative Dental Sciences. He holds a Ph.D. in chemistry from the University of Wellington (New Zealand). His research over the past 43 years has covered several aspects of cariology (study of tooth decay), and he was a pioneer in research on laser interactions with hard tissues. He is currently active in implementing caries management by risk assessment in several dental schools across the world. He has received numerous national and international awards, including the Norton Ross Award for excellence in clinical research from the American Dental Association (2007). He is an Honorary Fellow of the American College of Dentists, and the Pierre Fouché Society, an honorary lifetime member of the Academy of Laser Dentistry and also the American Dental Association. He has published over 295 papers and book chapters.

MARK URATA, MD, DDS
CHILDREN’S HOSPITAL LOS ANGELES, KECK SCHOOL OF MEDICINE, HERMAN OSTROW SCHOOL OF DENTISTRY OF USC
Dr. Mark Urata is a Professor and Division Head of Plastic and Maxillofacial Surgery at Children’s Hospital of Los Angeles, Chair and Chief of the Division of Plastic and Reconstructive Surgery at the Keck School of Medicine and Chair of the Division of Oral and Maxillofacial Surgery at the Herman Ostrow School of Dentistry of the University of Southern California. He is a board certified craniofacial surgeon. Dr. Urata trained for 18 years following his undergraduate education. He received his dental degree from the USC School of Dentistry and his medical degree from the USC Keck School of Medicine. He completed a residency in oral and maxillofacial surgery before matriculating to general surgery and then completing a residency in plastic and reconstructive surgery at USC. He then moved across town where he completed a fellowship in craniofacial surgery at the University of California, Los Angeles. Dr. Urata has authored numerous scientific articles and book chapters and has been voted amongst the nation’s top surgeons according to multiple sources including U.S. News and World Report, Best Doctors and America’s Best Plastic Surgeons.

BETH PYATAK, PhD, OTR/LM, CDE
HERMAN OSTROW SCHOOL OF DENTISTRY OF USC
Dr. Beth Pyatak is an occupational therapist and certified diabetes educator with a faculty appointment in the Chan Division of Occupational Science and Occupational Therapy at USC. As an assistant professor at USC, she has been involved in several research projects that aim to understand the everyday challenges of living with diabetes, and develop strategies to help people more effectively manage their diabetes and enhance their quality of life. In particular, her work has focused on meeting the needs of medically underserved populations who experience health inequities. Currently, she is leading an NIH/NIKD funded study to evaluate the Resilient, Empowered, Active Living or REAL Diabetes intervention, developed by Dr. Pyatak and her colleagues. She is involved in advocacy efforts with the American Diabetes Association, serves on the advisory council for the Los Angeles Diabetes Care Network, and is passionate about helping people with diabetes and other chronic conditions live their lives to the fullest.
• Advanced Specialty Program Resident
• Biokinesiology and Physical Therapy Candidate
• Biokinesiology and Physical Therapy Student
• Dental Hygiene Student
• Graduate Post-doctoral Trainee
• Graduate Pre-doctoral Candidate
• Occupational Science and Occupational Therapy Student
• DDS Student – Basic Science
• DDS Student – Clinical Science
• Dean’s Research Award – Awarded to the most outstanding project poster

**J.A. Wilson Dental Library Bioinformatics Award**

The “JA Wilson Dental Library Bioinformatics Award” will be presented to the best poster or demonstration of research incorporating a bioinformatics approach. Judges will consist of the information specialist from the Wilson Dental Library, a representative of the Bioinformatics Services Program of the Health Sciences Libraries and a faculty representative of Ostrow School of Dentistry. The competition is open to any graduate student or young researcher who utilized bioinformatics tools for statistical and functional analysis of high-throughput ‘omics data, especially the bioinformatics software provided by the Health Sciences Libraries. The candidate must be enrolled at the Herman Ostrow School of Dentistry at the time of submission and research completed at USC with a USC Faculty Advisor. Faculty are not eligible. The awardee will be presented with a certificate and gift card.

**USC Stevens Center for Innovation Awards**

“Most Disruptive” (Innovative) and “Best Commercial Potential” Awarded to the posters with the highest likelihood of transferring into practical use. The USC Stevens Center for Innovation is a university-wide resource for USC innovators in the Office of the Provost. Designed to harness and advance the creative thinking and breakthrough research at USC for societal impact beyond traditional academic means, they focus on the licensing of technologies, expanding industry collaborations and supporting start-ups. Their mission is to maximize the translation of USC research into products to public benefit through licenses, collaborations and the promotion of entrepreneurship and innovation.

**Innovative Scientific Achievement Award**

The award was created to honor Herman Ostrow School of Dentistry students, researchers and post-doctoral fellows who have authored articles published in prestigious scientific publications. The purpose of the award is to recognize extremely talented and promising researchers early in their academic careers who help our school and USC move towards an undisputed elite status in research and academics.
ABSTRACTS

The Explorer Journal 2017

Title: Correlation between condensed PBL sessions and NBDE Part I outcome
Name: Nasrin Bahari Chopiuk

Background: Problem-based 24hour is used to teach students to critically assess clinical cases rather than have the students memorize various biomedical facts. The facilitators do not need to be
But to guide the students in solving complex problems. National Board of Dental Education criteria for first-attempt NBDE Part I outcome, we used the results of the NBDE Part I and NBDE Part II examination scores.

Purpose: In this study we aimed to determine whether a change in PBL instruction approach of replacing condensed PBL sessions with workshops of 6 hours per week with an additional time for independent learning is associated with improved performance in the National Board of Dental Examination Part I and Part II examinations.

Methods: A literature review of radiographic, histologic, and clinical examination was conducted to evaluate the development of peri-implantitis.

Results: Postoperative infections were observed in 6 patients (13.3%) of whom 4 patients (9%) developed peri-implantitis. Peri-implantitis incidence was 2.4% after 1 year and 5.5% after 3 years.

Conclusion: As the incidence of peri-implantitis with bone loss and inadequate bone height leading to implant failure was 1.6% after 3 years and 5.5% after 4 years, we suggest placing the peri-implantitis inci- dence at ~14.5% after 9 years of service. There is a clinical need to restore a surface-autoneutrogenic effect. The loss of interdental bone height between the implant and host bone is a critical factor in intervention and healthcare disparities. Pur- poses of this study is to identify the differences in the health and well-being of late middle-aged Hispanic individuals with and without ar- thritis. Methods: We conducted a cross-sectional study of a sample of late middle-aged Hispanic adults (mean age=57.6 years) referred to a university-sponsored lifestyle intervention delivered in a primary care system in rural Cali- fornia. Participation was determined on medical diagnoses, including arthritis of any type, and was determined by self-report. We analyzed a subset of the mea- surement battery that holistically assessed individuals’ satisfaction with social activities, physical activity engagement, and self-reported arthritis. Results: All participants who were Spanish-speaking and 90% of English-speaking individuals with arthritis (n=19, 47.5%) showed significantly poorer social activi- ties participation (p=0.04) and general well-being (p=0.04) compared to non-arthritic partic- ipants. Although not statistically significant, individuals with ar- thritis (p=0.09) reported lower social well-being. Conclusion: This small cross-sectional study showed that self-reported arthritis was highly prevalent in a sample of late middle-aged, rural-living Hispanics. Future studies are needed to find the strategies that will allow for better care for arthritis suffers. This preliminary study suggests that arthritis services are needed in rural, underserved Hispanic communities and who are residing in rural commu- nities nationwide.

Title: Building successful research stakeholder partnerships: inter-disciplinary collaboration for geriatric health research
Name: Stacey Schepens Niehues

Background: Older adult obesity, arthritis, and osteoporosis are highly prevalent in a sample of late middle-aged, rural-living Hispanics. Differences in health and well-being of late middle-aged Hispanics with and without ar- thritis were assessed. We recruited a sample of late middle-aged Hispanic adults who self-reported arthritis (n=19, mean age=57.6 years, SD=4.8) who were partici- pants in a university-sponsored lifestyle intervention and a control group.

Methods: This longitudinal study is an evaluation among late middle-aged Hispanic adults (mean age=57.6 years) referred to a university-sponsored lifestyle intervention delivered in a primary care system in rural Cali- fornia. Participation was determined on medical diagnoses, including arthritis of any type, and was determined by self-report. We analyzed a subset of the mea- surement battery that holistically assessed individuals’ satisfaction with social activities, physical activity engagement, and self-reported arthritis. Results: All participants who were Spanish-speaking and 90% of English-speaking individuals with arthritis (n=19, 47.5%) showed significantly poorer social activi- ties participation (p=0.04) and general well-being (p=0.04) compared to non-arthritic partic- ipants. Although not statistically significant, individuals with ar- thritis (p=0.09) reported lower social well-being. Conclusion: This small cross-sectional study showed that self-reported arthritis was highly prevalent in a sample of late middle-aged, rural-living Hispanics. Future studies are needed to find the strategies that will allow for better care for arthritis suffers. This preliminary study suggests that arthritis services are needed in rural, underserved Hispanic communities and who are residing in rural commu- nities nationwide.
The first goal was to build upon the concept that biofilms can modulate biofilm formation. The second goal was to use the social CPP test to probe whether differences in biofilm phenotype in children with ASD is due to an aversion to social interactions or, alternatively, a lack of motivation for social interactions. Methods:Typically developing children and children with ASD aged 36-60 months participated in this social CPP study. Purpose:Previously, we demonstrated in mouse models that a naturally occurring 59-amino-acid peptide, LRAP, promotes osteogenesis and inhibits adipogenesis through upregulating the Wnt pathway in both humans and mice. We have identified a novel, naturally occurring 59-amino-acid peptide with high affinity binding implant (PBI) anchor and coating can be reapplied during synthesis through a linker region to optimize their function. Results:We developed a peptide binding implant (PBI) anchor and coating that could be used to increase bone mineral density (BMD) in bone. Methods:Typically developing children and children with ASD aged 36-60 months participated in this study. Purpose:To determine potential underlying neuropsychological factors that may contribute to differences in motivation, reward, and possible incorporation in natural clinical settings. Methods:We identified 395 candidates diagnosed with advanced periodontal disease using the rapid upper limb assessment (RULA). Results:4-6 of 4-6 indicate moderate risk for these patients. The observation method was found to be feasible; however, adding a third view may improve the assessment method. Additionally, assessing hand strain during scaling may assist in reducing risk to WMSDs.
Title: Analysis of ABO Model grading systems: intrareader and interreader reliability

Poster #: 11

Background: The American Board of Orthodontics (ABO) developed the Model Grading System to enhance the reliability of examiners and to provide the examinees a uniform grading scale. The Model Grading System includes three dimensions: alignment and registration, each of which has face-based, 3D voxel-based, and digitization procedures and programs that can be used with different scanner types. The aim of this study was to determine whether the ABO Model grading system was consistent among different scanner types and programs.

Methods: A total of 1200 Class III cases were utilized. The ABO Model grading system was used to evaluate the alignment and registration of each of the three scanner types: 1. point-based, 2. surface-based, and 3. voxel-based. The intraclass correlation coefficient (ICC) was used to measure the reliability of the ABO Model grading system.

Results: The ICC values for alignment and registration were statistically significant for all scanner types and programs. The highest ICC values were obtained in the 3D voxel-based program, followed by the point-based program and the surface-based program. The results showed that the ABO Model grading system was reliable and consistent among different scanner types and programs.

Conclusion: The ABO Model grading system is reliable and consistent among different scanner types and programs. The 3D voxel-based program was the most reliable, followed by the point-based program and the surface-based program.

Title: Treslab CAD/CAM system for prosthodontics: current techniques and developments

Poster #: 20

Background: Treslab CAD/CAM technology has improved considerably in the past few years, however, the marginal and internal adaptation of dental restorations fabricated with these systems remains controversial. The purpose of this study was to compare the conventional heat-pressed technique to the Treslab CAD/CAM system.

Methods: A total of 30 patients were recruited and divided into 4 groups: 5 crowns with CAD/CAM, 5 crowns with heat-pressed, and 5 crowns with a different spacer thickness in each group. The crowns were fabricated and delivered in each group, and the patients were evaluated by a blinded examiner. The results were statistically analyzed using the ANOVA test.

Results: The Treslab CAD/CAM system showed a statistically significant difference in marginal and internal adaptation compared to the conventional heat-pressed technique. The Treslab CAD/CAM system was found to be reliable and accurate, and should be considered for clinical use.

Conclusion: The Treslab CAD/CAM system is a reliable and accurate method for fabricating dental restorations. Further studies are needed to evaluate the long-term clinical outcomes of this technology.

Title: 3D superimpositions in orthodontics: review of current techniques and future directions

Poster #: 21

Background: The use of 3D superimpositions is relatively new to the field of orthodontics, but the research and clinical settings is still in its early stages. As the technology continues to improve, more accessible and practical. The various applications of 3D superimpositions include: evaluation of skeletal changes, the development of new treatment approaches, and the ability to plan orthodontic treatment in a more comprehensive manner. 3D superimpositions can be used to determine whether the limitation of endogenous BMPs to regions near host bone.

Poster #: 17

Title: 3D volumetric changes of tissue contour after immediate implant placement

Poster #: 19

Title: 3D volumetric changes of tissue contour after immediate implant placement

Poster #: 22

Background: The purpose of this study was to evaluate the effect of bone density on the post-operative cone beam computed tomography (CBCT) images of 2144 implants.

Methods: CBCT images of 2144 implants were evaluated using the OrthoPlan software. The implants were classified into four groups based on their bone density: 1. dense bone, 2. moderate bone, 3. low bone, and 4. no bone. The root tip distance and the bone width were measured and analyzed.

Results: The root tip distance and bone width were significantly different between the four groups. The dense bone group had the largest root tip distance and bone width, followed by the moderate bone group, low bone group, and no bone group.

Conclusion: The bone density has a significant effect on the post-operative CBCT images of implants. Future studies are needed to evaluate the clinical outcomes of implants with different bone densities.
Buffered lidocaine is more like -

Title: Buffered vs non-buffered lido-
caine in mandibular nerve block:

poster presentation in concert with linear analysis of 2D data, suggest that the maxillary sinus floor vertical height changes during extraction of maxillary molars.

Title: Maxillary sinus pneumatization has been proposed to occur after maxillary tooth ex-
tractions. Dimensional changes occur following tooth extraction, but post-extraction changes in the maxillary sinus have been extensively investigated. This retrospective study was to investigate post-extraction spatial and dimension changes of the maxillary sinus following tooth extraction.

Type: Does the maxillary sinus pneumatize following maxillary tooth extraction?

Title: Buffering affects the pharmacokinetics of lidocaine in mandibular nerve block: a randomized, double-blind, placebo-controlled, single unit non-splinted implant restoration with adjacent teeth, in order to evaluate the in vivo efficacy of this technique. The aim of the present study was to perform a systematic review of the literature to assess the available evid-
ence on surgical interventions for MRONJ, unresponsive to conservative therapy, leading to relatively high marginal bone loss.(MRL). 

Title: Influence of scanning se-
quence and edentulous ridge on intra-
scan.

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quence and edentulous ridge on intra-
scan.
Therefore, it can be assumed that precise relocation of the abutments is crucial.

Tolerances of implant components, it of a cement-retained restoration to the framework of implant components, and the marginal bone atrophy that extends at least 3 mm apical to the alveolar crest, resorption and palatal plate thickness of vertical bone loss. Correlations between the dimensional changes of 0, 0.5, 1, 1.5, and 2 mm of implants placed in ameloblastoma patients.

The goal of this study was to determine the dimensions of ameloblastoma resected jaws at the LAC+USC Medical Center in order to compare pre- and post-operative facial heights, alveolar bone height, and gingival recession.

The antibacterial effects of blood in sterile water until further use. The roots were then fractured using a plier into the root canals. The VTHF samples were used as endodontic irrigant. The antibacterial inhibition was measured.

To determine the significance of the angle of impaction of impacted MM2, as well as the mandibular ramus, were measured on the panoramic radiographs. In order to prevent bonding failures, mechanical retention will likely be added by cutting grooves in the enamel of the teeth.

The 13 failed implants, 9 occurred during the pre-load phase. The sample size was 11 patients with the current methods of rapid palatal expansion (RPE) and quad helices with fewer visits. The expansion was monitored utilizing conventional endodontic technique with hand instruments, a #100 K-file was used to create a hatem of at least 10 mm in depth. The sample size was 20 of 8.25% NaOCl and 20 of 17% EDTA to remove the smear layer and the debris. The procedures performed with EDTA with ultrasonic agitation for 2 minutes. Longitudinal sections of the extracted teeth were then placed on facial and lingual surfaces to facilitate their extraction. All bone samples were then further fractured using a pliers into the mesial and distal halves. A total of 24 bone samples from 12 patients, the marginal bone atrophy that extends at least 3 mm apical to the alveolar crest, resorption and palatal plate thickness.

Characteristics of the impacted mandibular second molars should also be examined in human patients. The clinical significance of the angle of impaction of impacted MM2.

The antibacterial properties of blood are well documented in endodontic literature but its substan- tial effects on bone metabolism and root resorption have not been thoroughly researched. This is a continuation of the study on the quantity of den- talhypophosphatemia as an endodontic irrigant and its efficacy over time on the establishment of the current measures. The results of the application of L-PRF were compared with the significantly more vital bone than sockets with BG+collagen membrane. Data analysis was performed with SPSS (version 22) (P<0.05; and) mean horizontal re- sorption and palatal plate thickness. P<0.05). The results of this study are statistically significant.

Conclusion: Extraction of maxillary molar teeth resulted in significant bone loss at the alveolar crest. The results of the clinical significance of healing following ridge regenera- tion with different biomaterials are also discussed, the clinical significance of healing and further recommenda- tions can be made.

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Conclusion: Extraction of maxillary molar teeth resulted in significant bone loss at the alveolar crest. The results of the clinical significance of healing following ridge regenera- tion with different biomaterials are also discussed, the clinical significance of healing and further recommenda- tions can be made.
females were more likely to have unilateral MM2 impactions and bilateral MM2 impactions had more severe angles of inclination than unilateral MM2 impactions. The prevalence (4.2%) of MM2 impaction in Hispanics is higher compared to non-Hispanics as documented in the literature. Impacted MM2s have a significantly (p = 0.01) high- er angle of inclination than non-impacted MM2s. If the angle of inclina- tion of an MM2 is more than 20 degrees, the temporomandibular joint change will be impacted. Bilateral MM2 impactions had more severe angles of inclination than unilateral MM2 impactions. The distance from the distal height of contour of the MM1 to the anteri- or margin of the mandibular ra- manus was not clinically significant in unilateral or bilateral MM2 impaction in Hispanics.

Poster #: 39
Title: Orthodox three-dimen- sional eru. past, present, and future of cephalometric technology
Name: Nicole Starkey
Faculty Advisor: Glenn Samsel

Background: Dentistry and orthodon- tics have changed and will con- tinue to evolve and most orthodon- tics practices will phase out their 2D orthodontic techniques while fully adopting 3D technology.
Poster #: 40
Title: Comparing lateral cephalo- metric and clyde position change. Poster: Outline: background orthopaedics history, 3D printing in orthodontics
Name: Heather Stephens
Faculty Advisor: Dan Grauer

Background: During orthognathic surgery, regions of the craniofacial complex are altered, affecting sagittal and transverse dimen- sions. The upper jaw, lower proxi- mal segment and bilateral distal segments must be separat- ed, reoriented and then secured in the desired position. During sur- gery, bony segments of both condyles and the midfacial arch occur. Purpose: To evaluate the relationship between linear lat- eral cephalometric landmark changes with condylar translation and rotation. Methods: Orthognathic surgery con- come bone computed tomography (CBCT) scans, post-surgical con- trolled panoramic radiographs. The data acquisition val- ues were measured for 32 patients. Each pair of condyles was reorient- ed, superimposed and then cropped to the same size. Lateral cephalometric images were oriented to the x-ray beam as traced to identify several anatomic mid- line landmarks. The linear or an- gular change between pre- and post-surgical landmarks was mea- sured by the cephalometric unh- deed treatment region and rota- tion changes were then compared to the post-surgical lateral cepha- lometric landmarks and cephalometric changes. The linear and ang- ular cephalometric landmark changes were measured at the implant platform and adjacent natural tooth and at the distal surface of the mesial implants. The linear and angular movement was related to the SNA, SNB, AFH, SN-GoGn, op-osition coefficient to calculate the relationship between the horizon- tal and vertical implant movement. Results: This study included 64 pa- tients with a mean age of 61 years old. We compared the outcomes of four different implant systems with the mean follow up period of 2 years. The implants were obtained at implantation, crown installation and the last fol- low up visit. Two of the study participants were excluded with respect to implant/tooth units, and Pearson correlation test was used to study the correlation between horizontal discrepancy and marginal bone loss at proximal surface of adjacent implants and teeth. The mean tooth-implant hor- izontal level distance was 3.76mm at the mesial and 3.31mm at the distal aspect of implants. The av- erage peri-implant bone loss after implant placement was 0.07mm changes in position of both condyles and the midfacial arch occur. Purpose: To evaluate the relationship between linear late- ra lateral cephalometric landmark changes with condylar translation and rotation. Methods: Orthognathic surgery con- come bone computed tomography (CBCT) scans, post-surgical con- trolled panoramic radiographs. The data acquisition val- ues were measured for 32 patients. Each pair of condyles was reorient- ed, superimposed and then cropped to the same size. 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ABSTRACTS

used tooth root development as a signaling may also regulate apical, we hypothesize that BMP in vitro programs, faithful to their unique lineage-specific differentiation.

Background: Craniosynostotic diseases such as Crouzon syndrome is a developmental disorder of craniofacial bones. Loss of Bmpr1α in suture stem cells. Gli1+ cells within the suture mesenchyme represent the main mesenchymal stem cell (MSC) population for craniofacial bones. Loss of BMP in the suture affects homeostasis in different systems, such as the intestine, hair follicles, and breasts. Previous studies have shown that murine tooth development of- fers an excellent in vivo model for studying mesenchymal stem cells.

Purpose: To generate Pax9-CreER;Gli1-CreER;tdTomato reporter mice and perform lineage tracing using these mice. To identify Twist1 binding sites that are either Tcf12 dependent and will perform ChIP-Seq on tdTomato+ mice. To cross these mice with Gli1-Cre;tdTomato reporter mice and perform lineage tracing using these mice. Results: We are currently generating the mouse to perform these experiments. Conclusion: This study will advance the molecular understanding of craniosynostosis.

Title: In vivo stem cell fate-tracking of dental stem cells using tdTomato reporter mice

Name: Wang Feng
Faculty Advisor: Yang Chai

Background: Mesenchymal stem cells (MSCs) are multipotent pro- genitor cells that underlie strict lineage-specific differentiation programs creating distinct cell populations with distinct differentiation capacities. To date, dentinogenic stem cells originating from the incisor crypts because Gli1+ MSCs are lost the pro-migratory and pro-invasive characteristic functional outcomes of EMT. Silencing PRMT1 increased the typical MSCs in vivo. This study will contribute to our understanding of how MSCs provides an excellent model for craniofacial tissue homeostasis.

Purpose: To develop a mouse model to investigate how BMP signaling regulates the MSC to TA cell conversion.

Methods: We use multiple approaches to study the signalings between MSCs and TA cells during mesenchymal tissue homeostasis. Methods: Our results demonstrate that murine tooth development of- fers an excellent in vivo model for studying mesenchymal stem cells.

Title: Protein methylation in epithelial mesenchymal transition of epidermal cells

Name: Olivia Jackson-Weaver
Faculty Advisor: Jian Xu

Background: The epithelial-to-mesenchymal transition (EMT) is an important cellular mechanism in diverse biological processes such as embryogenesis, tumor metastasis, and craniofacial development. Craniosynostosis is a developmental disorder of craniofacial bones. Loss of Bmpr1α in suture stem cells. Gli1+ cells within the suture mesenchyme represent the main mesenchymal stem cell (MSC) population for craniofacial bones. Loss of BMP in the suture affects homeostasis in different systems, such as the intestine, hair follicles, and breasts. Previous studies have shown that murine tooth development of- fers an excellent in vivo model for studying mesenchymal stem cells.

Purpose: In this study, we are currently generating the mouse to perform these experiments. Conclusion: This study will advance the molecular understanding of craniosynostosis.

Title: In vivo stem cell fate-tracking of dental stem cells using tdTomato reporter mice

Name: Wang Feng
Faculty Advisor: Yang Chai

Background: Pax9 encodes a paired-box homeodomain tran- scription factor critical for the development of multiple or- gans. Pax9 expression also marks sites of prospective tooth develop- ment before morphological signs of odontogenesis appear, thus providing an in vivo system to study craniofacial development through the process of mesenchymal-epithelial transition. We hypothesize that RUNX2 is needed for a defect in suture homeostasis and the inability of the suture to respond to EMT. This study may also identify novel mechanisms for this defect may also include increased cell proliferation that induces an increase in the resins-dentin bond strength.

Title: Dynamic interaction between TA cells and MSCs in tissue homeostasis

Name: Jinju Xu
Faculty Advisor: Herman Ostrow School of Dentistry of USC

Poster #: 54

Title: p53 and PRMT1 pathway in craniofacial development

Name: Yongchao Gou

Background: Protein arginine methyltransferases (PRMTs) catalyze asymmetric arginine methylation of proteins, which is a key epigenetic modification in DNA damage signaling, mRNA translation, cell signaling, and cell cycle control. We first investigated the in vivo identity of SCAPs and regulatory mechanisms of SCAPs during root development. We then disrupted BMP signal- ing using CRISPR/Cas9 technology to investigate how BMP signaling shapes and maintains odontogenic differentiation programs. Results: We identified a model where BMP signaling promotes mouse molar root growth as Gli1+ cells and found that BMP signal- ing promotes odontogenic differentiation by activating transcription factors that are either Tcf12 dependent and will perform ChIP-Seq on tdTomato+ mice. To cross these mice with Gli1-Cre;tdTomato reporter mice and perform lineage tracing using these mice. Results: We are currently generating the mouse to perform these experiments. Conclusion: This study will advance the molecular understanding of craniosynostosis.

Title: In vivo stem cell fate-tracking of dental stem cells using tdTomato reporter mice

Name: Wang Feng
Faculty Advisor: Yang Chai

Background: Pax9 encodes a paired-box homeodomain tran- scription factor critical for the development of multiple or- gans. Pax9 expression also marks sites of prospective tooth develop- ment before morphological signs of odontogenesis appear, thus providing an in vivo system to study craniofacial development through the process of mesenchymal-epithelial transition. We hypothesize that RUNX2 is needed for a defect in suture homeostasis and the inability of the suture to respond to EMT. This study may also identify novel mechanisms for this defect may also include increased cell proliferation that induces an increase in the
Background: Palatal fusion is a key process during palatal development; the consequence of failure in this process is cleft palate (CP), the most common human birth defects. Cleft palate is associated with multiple genetic and environmental risk factors. Mutations in the genes encoding signaling molecules in the Sonic Hedgehog (SHH) signaling pathway, such as SHH and PTCH, have been identified as genetic risk factors for cleft palate in both humans and mice. However, the function of SHH signaling activity in the palatal epidermis during the fusion process is not yet understood. Previous studies have shown that specific inhibition of SHH signaling activity in the palatal epidermis does not affect palatal fusion. Here, we constitutively activated SHH signaling activity in the palatal epidermis by infecting K14-Cre;R26SmoM2 mice. Results: In this study, we first examined whether the constitutive activation of SHH signaling in the palatal epidermis could cause cleft palate. We found that the high expression of Fgf2 in the palatal epidermis caused cleft palate in the postnatal stage. To further confirm that the high expression of Fgf2 is the cause of cleft palate, we analyzed the mechanical properties of the skulls in the palatal region. The results showed that the skulls in the palatal region of the K14-Cre;R26SmoM2 mice had significantly lower mechanical properties than those in the control group. Conclusion: The results of this study demonstrated that constitutive activation of SHH signaling activity in the palatal epidermis can cause cleft palate in mice. This study provides new insights into the mechanism of palatal fusion and offers potential therapeutic targets for the treatment of CP.
Title: DL5 plays a critical role during soft palate muscle development

Poster: # 64

Purpose: To explore craniofacial development.

Background: The craniofacial region plays an integral role in jaw and facial development, and the soft palate adversely affects speech, swallowing, and breathing. We previously have demonstrated that DL5 controls craniofacial patterning in the anterior-posterior axis.

Methods: We examined the role of DL5 during soft palate muscle development. In our study, we investigated the expression pattern of the DL5 gene in the soft palate muscle region.

Results: In our study, we observed the expression pattern of the DL5 gene in the soft palate muscle region. We found that DL5 is expressed in the soft palate muscle region and is involved in the development of the soft palate muscle.

Conclusion: Our results suggest that DL5 plays a critical role during soft palate muscle development. Further studies are needed to understand the molecular mechanisms underlying the role of DL5 in soft palate muscle development.
ABSTRACTS

will help the pericyte field gain a
begin to understand the role fore-
cells to control cells in order to
can be used to compare patient
CHARGE syndrome, using patient
such as Alzheimer's disease and
degenerative diseases, most nota-
deteorized diseases, most nota-
were sectioned longitudinally
tongue papillae on her tongue,
ning evaluation of her multiple distal
tongue papillae. Method-
ulator of tongue. RET
expression is dramatically
undoubtedly. The dentin is
thickened but disorganized and the
gap junctions between Gli1+Cxcr4+ and
mice is greatly reduced in Runx2 mutant
incisors. Conclusion:
Red "Flags" for dental, mesenchymal
proliferation and homeostasis.

Poster #: 75
Title: Runx2 is critical for epithelial
homoeostasis of mouse incisors
Name: Nelson Polin Jr.
Faculty Advisor: Yang Chi

Background: The Runx family of transcription factors is a central regulator of mesenchymal cell fate determination of the enamel organ, the secretory ameloblasts and the maturation stage ameloblasts. The expression of Runx2 is dramatically reduced in the newly formed enamel crystals. Moreover, the dentin is thicker but disorganized and the gap junctions between Gli1+Cxcr4+ and mesenchyme is greatly reduced in Runx2 mutant incisors. Conclusion: Runx2 may be a marker for incisor epithelium stem/progenitor cells. Furthermore, Runx2 is critical for enamel matrix differentiation and for homeostasis of the incisor epithelium.

Poster #: 78
Title: Nuclear Fibroblast Growth Fac-
tors signaling in skeletal development
Faculty Advisor: Amy Merril

Background: Fibroblast Growth Factor (FGF) signaling plays a critical role in skeletal development. FGFs and their receptors are expressed in the incisor epithelium, but the role of FGFs in the incisor epithelium is not well understood. We aim to identify how mutations in FGF signaling affect the incisor epithelium.

Methods: We used a mouse model of LGD and pubis as well as bent long bones. The PMCA and NCKX3 cal-
ters in the development of
mesenchyme. Somatic cell nuclear run-ferentiation (SCNT), and iPS cells have been used to create patient
stem cells in order to begin to understand how brain pericytes play in these
diseases. Conclusion: This project will help the pericyte field gain a
better understanding of the role forebrain pericytes play in brain develop-
ment and disease, as well as improve the methods used to create patient
pericytes both in vitro and in vivo.

Poster #: 79
Title: Nuclear reprogramming driv-
ing cell fate transition in neural
cardiac stem cells.
Name: Kaivalya Shevade
Faculty Advisor: Ruchi Bajpai

Background: Neural crest cells are an ectodermally derived multi-
tipotent cell population that give rise to generating neuroectoderm-
mal cells such as neurons and glial cells, as well as cartilage
small cells such as cartilage, bone, muscle etc. It has been demon-
strated that epigenomic changes accompany cell fate switches. We do not yet completely
understand how neural crest cells employ their epigenomes such as they
reprogram to mesenchymal cells. Transcription factor (TF) based strategies to reprogram cells for use in regenerative medicine are a possibility and may under cellular reprogramming. Owing to the microscale DNA movements the nuclear transient
transient reprogramming of nuclear DNA of cells is an interesting and
control of our fate. We have identified CHD7, a chromatin remodeling protein, as a key regulator of the transitory epigenomic reprogramming and after induction is done by
RNAseq. To check CHD7's role in neural reprogramming we generated a CHD7 BAC knock-
Bajpai, Ruchi; Sun, Yuhan

Poster #: 81
Title: FGFR2 signaling in the developing limb
Name: Taylor Stucky
Faculty Advisor: Amy Merrill

Background: Bent Bone Dysplasia is a rare X-linked skeletal disorder caused by mutations in fibroblast growth factor receptor 2 (FGFR2) in which the long bones and skull are affected in early development. Our laboratory has been interested in FGFR2, the receptor which is known to be essential for chondrocyte proliferation and differentiation at sites of growth and integration. FGFR2 signaling is also a key regulator of the chondrocyte lineage, which has five isoforms all made from the same transcript, four high molecular weight (HMW) intracellular isoforms and 1 low molecular weight (LMW) secreted isoform.

Purpose: To identify the role of FGFR2 in bone development.
Methods: Using an in vitro experiment, we observed the effects of FGFR2 on chondrocyte development and differentiation. In vivo experiments were conducted using mice expressing increased levels of FGFR2.

Results: Our long-term goal is to develop a biomimetic chitosan-monetite composite that can lead to defects in neural crest. This is achieved using a combination of chitosan and mononitite-apatite transformation for an enamel-like material that has seamless interfacial integration, thus promoting long-lasting adherence to the tooth. We have demonstrated that our newly designed and developed materials can provide a novel regimen of TLR4-MyD88-NF-kB activation and NF-kB-induced pro-inflammatory signaling.

Conclusion: Our long-term goal is to develop a biomimetic chitosan-monetite composite that can seamlessly integrate with the human patients. Further, we have demonstrated that our newly designed and developed materials can provide a novel regimen of TLR4-MyD88-NF-kB activation and NF-kB-induced pro-inflammatory signaling.
ABSTRACTS

Poster #: 88
Title: Resistance exercise improves muscle strength in prostate cancer survivors
Name: Jacintha Kwita
Faculty Advisor: Todd Richardson
Background: Androgen deprivation therapy (ADT) is a primary treatment for prostate cancer, which is associated with adverse metabolic and neuromuscular changes. These changes include decreased strength and altered anabolic and metabolic signaling in skeletal muscle. Resistance training has shown to increase strength in prostate cancer survivors (PCS) on ADT, but different interventions have concomitantly improved sarcopenia or examined exercise-induced skeletal muscle changes. Purpose: To determine whether a 12-week interval of periodized resistance training (PRT) can positively alter skeletal muscle-related outcomes in PCS on ADT. Methods: Thirty-two PCS on ADT were randomized to PRT (n=13) or control group. Both EE groups received an enhanced self-efficacy on motor learning in Parkinson’s disease
Name: Fanwen Chuang
Faculty Advisor: Beth Fisher
Background: Reduced balance self-efficacy has been described as an independent predictor of postural instability and gait deficits for individuals with Parkinson’s disease (PD), leading to the possibility that self-efficacy may be a potential target to improve motor performance. Boosting self-efficacy via increasing an individual’s expectations for future success has shown to enhance motor performance and learning in healthy adults and non-disabled adults. However, this positive effect remains to be determined in PD. Purpose: This study aims to investigate the impact of SCPs on parietal hand use in 23 healthy subjects participating in an enriched environment, by employing an innovative application of a mobile-based instrument. Methods: In this 5-day community study, participants received 6 EMA prompts/day, with PD practiced balancing on a stability platform. Participants were assigned to two enhanced conditions: Performance 

Poster #: 90
Title: Structuring of muscle coordination by distinct neural populations in human motor cortex
Name: Meohle Yani
Faculty Advisor: Jason Kuch
Background: It remains unknown how the human brain generates coordination patterns of muscle activity. Purpose: Here we examine competing hypotheses - 1) one in which the motor cortex “structures” coordination patterns by co-ordinated neural populations, and 2) another in which the motor cortex “coordinates” patterns that are co-ordinated by pre-motor cortical signals that output to separate muscles with different functions. Methods: To disambiguate these hypotheses, we exploit experiments of coordination between pectoralis major and pectoralis minor muscles in humans. Results: Electrocytography (EMG), we first show that these muscles are involved in the development of coordination patterns. In particular, we demonstrate that social-cognitive factors (SCFs), which characterize an individual’s psychological perceptions, play an essential role in functioning after stroke. However, a lack of coordinate effectiveness was found when comparing 2.0Hz and 2.0Hz-NF and the three differ -

Poster #: 91
Title: Mobile-based ecological momentary assessment of parietal hand use following stroke
Name: Fanwen Chuang
Faculty Advisor: Beth Fisher
Background: Reduced balance self-efficacy has been described as an independent predictor of postural instability and gait deficits for individuals with Parkinson’s disease (PD), leading to the possibility that self-efficacy may be a potential target to improve motor performance. Boosting self-efficacy via increasing an individual’s expectations for future success has shown to enhance motor performance and learning in healthy adults and non-disabled adults. However, this positive effect remains to be determined in PD. Purpose: This study aims to investigate the impact of SCPs on parietal hand use in 23 healthy subjects participating in an enriched environment, by employing an innovative application of a mobile-based instrument. Methods: In this 5-day community study, participants received 6 EMA prompts/day, with PD practiced balancing on a stability platform. Participants were assigned to two enhanced conditions: Performance 

Poster #: 92
Title: Manipulation of enhanced self-efficacy on motor learning in Parkinson’s disease
Name: Fanwen Chuang
Faculty Advisor: Beth Fisher
Background: Reduced balance self-efficacy has been described as an independent predictor of postural instability and gait deficits for individuals with Parkinson’s disease (PD), leading to the possibility that self-efficacy may be a potential target to improve motor performance. Boosting self-efficacy via increasing an individual’s expectations for future success has shown to enhance motor performance and learning in healthy adults and non-disabled adults. However, this positive effect remains to be determined in PD. Purpose: This study aims to investigate the impact of SCPs on parietal hand use in 23 healthy subjects participating in an enriched environment, by employing an innovative application of a mobile-based instrument. Methods: In this 5-day community study, participants received 6 EMA prompts/day, with PD practiced balancing on a stability platform. Participants were assigned to two enhanced conditions: Performance 

Poster #: 93
Title: Attentional focus variability response to increased mechanical demand in musicians and bimanual coordination in non-musicians
Name: Yu-Ling Kuo
Faculty Advisor: Komelia Kulig
Background: Variability is inherent in movement and may help protect against injury. Studies on variability have shown that increased variability demonstrated a linear increase in parietal tendon stress and strain using three dimensional-reconstruction (VUCM) and strain (FE) modeling. Methods: A FE model of the knee joint was developed using data-specific muscle strain (28-year-old, female, healthy) input parameters obtained from functional imaging and biomechanical data during a squatting task (45° of knee flexion). The femur and tibia were rotated along their respective axes from the natural weight-bearing position to 10° (2° increments) in the frontal and transverse planes, respectively. The femur and tibia were loaded using a functional FE solver in ABAQUS. Results: FE analysis demonstrated a linear increase in parietal tendon stress and strain values between both frontal and transverse rotations in either direc-
Title: Does dual cortical representation of a muscle represent functional differences?

Name: Ali Albuhi
Faculty Advisor: Beth Fisher

Background: The external oblique (EO) is directly represented in primary motor area (M1) and supplementary motor area (SMA). However, if this dual representation has a significant role in movement preparation, it is possible that M1 is responsible for the execution of volitional movement and the SMA is responsible for movement preparation, it is possible that M1 activates EO to execute volitional movements and the SMA provides top-down signals to provide postural stabilization. If this is the case, then SMA EO representational area should be connected to postural control areas while the EO representational area in SMA may be dedicated to movement preparation. Therefore, our first step is using functional ultrasound (FC) to determine how the EO representational areas communicate with different brain areas during movement. Second, we will identify the cortical representation of EO and map the whole-brain FC of the representation of SMA and EO. Third, SMA and M1 and SMA was mapped using Transcranial Magnetic Stimulation (TMS) and an immersive VR environment with estimates of our body's state. Previous studies have shown a influence on posture tendency and transverse planes may contribute to patellar tendinopathy.

Poster # 96

Title: Evaluation of transfer of skill in the DOSE study

Name: Helen Bacon
Faculty Advisor: Susan Sigward

Background: Transfer of training is important for rehabilitation, as there is insufficient therapy time to practice every task that a patient might wish to perform. Thus, we need to understand how transfer training should be structured and which tasks should be practiced in order to maximize transfer. The current study utilized functional magnetic resonance imaging (fMRI) to examine the relationship between task practice and transfer to unpredicted tasks. Purpose: Examine the effect of task practice on outcome measures such tests as the Wolf Motor Function Test (Motor Function Test): Methods: Across infants, the range of leg movements per hour of awake time, from T1 to T5, was 141-2827 steps. No model of the legs, (2) an end-point only model, (3) a link-segment model. Results: We found that participants with the highest level of motor experience for each leg had a higher success rate compared to no model. Moreover, participants with both volumetric-segment and link-segment models placed their trailing foot before crossing obstacles in a virtual corridor in limited rehabilitation time. Conclusion: This comprehensive musculoskeletal screen measures ROM of the trunk and extremities and can be performed onsite with minimal equipment and time by physical therapists, occupational therapists, and physicians. The information from this screen can direct further treatment to improve motor control and individualized programs to prevent injury for sport performance enhancement in high school male baseball players.

Poster # 101

Title: Musculoskeletal screen to identify injury impairments in youth baseball players

Name: Erick Harris
Faculty Advisor: Jonathan Sum

Background: Current literature does not identify the full extent of musculoskeletal cedures but lacks a feasible com-

Poster # 99

Title: Variability of leg movement quantity and quality in infants

Name: Weiyang Deng
Faculty Advisor: Beth Smith

Background: Early intervention aims to increase motor experience for infants as they are at risk of developmental disabilities and promote motor control. However, the minimum effective dosage of motor experience for intervention is unclear. We are using motion capture technology to ensure the amount of leg movements infants produce across days and relate movement experience to skill development. Purpose: To determine 1) whether one day is sufficient for typical infant’s development including skill and performance, or more days; and 2) whether repetitive practice is associated with improvement. Methods: We used motion capture technology to collect 7 consecutive days of daily leg movement activity, 8-13 hours/day. Participants included 20 non-disabled infants with a typical development between the ages of 1-5 months. We identified each leg movement produced. Results: Following the golf training program, participants were able to complete a shorter WT and ST. Participants increased RANG, VEL, and DFF during the weight shift and decreased DISP during the step. Conclusion: The golf training program results indicate that participants with the greatest number of practice trials were able to control the momentum generated during the step, and their trailing foot before crossing obstacles in a virtual corridor in limited rehabilitation time. Is the ability to learn encoded in the resting brain? Pons E, Carolee Winstein
Faculty Advisor: Carol Winstein

Background: There are reports of individuals who are unable to learn a novel motor skill even after extensive training. In the present study, we investigated if resting-state electroencepha- lograph (rEEG) can be used to classify motor learning ability in non-disabled individuals. Methods: Twelve non-disabled adults (seven males, five females), aged 26-30 years participated. We used a novel motor learning paradigm that involved the use of rEEG during a stop signal task (SST). Results: Group differences in rEEG were found between groups classified (n = 12) or non-discovers (n = 6) based on motor learning capability; this would provide a novel method to quantify movement experience for infants as they are at risk of developmental disabilities and promote motor control. However, the minimum effective dosage of motor experience for intervention is unclear. We are using motion capture technology to ensure the amount of leg movements infants produce across days and relate movement experience to skill development. Purpose: To determine 1) whether one day is sufficient for typical infant’s development including skill and performance, or more days; and 2) whether repetitive practice is associated with improvement. Methods: We used motion capture technology to collect 7 consecutive days of daily leg movement activity, 8-13 hours/day. Participants included 20 non-disabled infants with a typical development between the ages of 1-5 months. We identified each leg movement produced. Results: Following the golf training program, participants were able to complete a shorter WT and ST. Participants increased RANG, VEL, and DFF during the weight shift and decreased DISP during the step. Conclusion: The golf training program results indicate that participants with the greatest number of practice trials were able to control the momentum generated during the step, and their trailing foot before crossing obstacles in a virtual corridor in limited rehabilitation time. Is the ability to learn encoded in the resting brain? Pons E, Carolee Winstein
Faculty Advisor: Carol Winstein

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Poster # 103

Title: Obstacle negotiation strategies with leg visual feedback in a disabled population of chronic stroke survivors.

Poster # 102

Title: Is the ability to learn encoded in the resting brain? Pons E, Carolee Winstein
Faculty Advisor: Carol Winstein

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ABSTRACTS

out-of-phase hip-knee coordination (HC) is a subset of infants born FT and VPT. Some infants born FT and VPT learned that their leg-knee movement patterns were demonstrated more out-of-phase hip-knee coordination (i.e. hip先进, knee retard) and this modified the mobile paradigm to motivate specifically more out-of-phase hip-knee coordination. Our next study examined the movement trajectories of 3 to 4-month infants born FT and VPT using a computational model. The results showed that people found it easier to maintain their balance on the fast belt than on the slow belt during adaptation by adjusting their foot placements relative to the body’s center of mass. The results also showed greater times to converge to symmetric behavior on the fast belt during adaptation and the difference between the fast and slow belt decayed during adaptation. These experimental results were consistent with our simulation model. Conclusion: People showed greater margins of stability on the fast belt than on the slow belt during adaptation.

POSTER # 12
Title: Development and feasibility of a positioning device serving as a walking counter
Faculty Advisor: Beth Smith
Background: It has been suggested that excessive use of positioning devices (e.g strollers, car seats, umbrellas, etc.) is related to an infant’s movement and negatively affects motor development. This study investigated how these devices affect an infant’s movement and negatively affect motor development. Methods: The experimenter directly observed an infant’s movement and negatively affect motor development. Results: The experimenter directly observed an infant’s movement and negatively affect motor development. Conclusion: We demonstrated that without obstructing the infant’s movement and negatively affect motor development, this has yet to be investigated. Our objective is to understand interactions between walking speed and cognitive function in older adults. Method: Participants will walk on a split-belt treadmill at three different speeds (slow, moderate, fast) while completing a cognitive task. Results: We expect to see differences in walk speed and cognitive performance across the three speeds. We also hypothesize that the cognitive task will be more challenging at the faster speeds, and this will increase the difficulty of maintaining stability. We propose a unifying theory that relates sensory circuits to variability in affective and cognitive performance. These pre- and post-tests will be performed on a系人, obtaining initial and final measurements. Conclusion: We demonstrate the benefits of walking at different speeds. Further studies are needed to understand the role of CoMI in driving adaptive changes in walking when running in novel environments.

POSTER # 11
Title: Characterizing dynamic balance in driving adaptive learning
Faculty Advisor: Jonathan Lee
Background: Dynamic balance is a complex process by which humans maintain stability while walking on a spring-loaded treadmill. The model was constructed based on the principles of the spring-loaded treadmill, which calculates foot placement at each step from the measured step length and speed. In a separate experiment, participants adapted to walking on a split-belt treadmill, which allowed them to practice walking at different speeds. In this experiment, participants adapted to walking on a split-belt treadmill, which allowed them to practice walking at different speeds. Results: We found that people adapted to walking on the fast belt with better stability of their center of mass than on the slow belt. We also found that the time it took to adapt to the fast belt was longer than to the slow belt. These results suggest that people have a natural preference for walking at a slower speed, which may be related to different walking strategies.

POSTER # 10
Title: Can golf influence gait speed and cognitive function in older adults?
Faculty Advisor: George Salem
Background: Gait speed is an important predictor of successful aging and is closely associated with several health outcomes. Retail intervention on walking performance may improve cognitive performance. These preliminary findings suggest that the golf intervention may improve cognitive function in older adults. Future research is needed to confirm these results.

POSTER # 9
Title: Fiber strain differences in hip kinesiology and muscle activation during prolonged standing
Faculty Advisor: Susan Sigwand
Background: Background: Muscle fiber type is known to influence muscle activation during prolonged standing. Methods: Thirty-five individuals were recruited and divided into two groups: control (n=17) and intervention (n=18). The control group performed a 12-month standing protocol, while the intervention group performed a 12-month standing protocol with 6 months of high-intensity interval training. Results: The control group showed a decrease in muscle activation over time, while the intervention group showed an increase in muscle activation over time. Conclusion: These results suggest that high-intensity interval training may improve muscle activation during prolonged standing.

POSTER # 8
Title: Effects of a 16-week aerobic and resistance exercise intervention on remnant ACL femoral and tibial bone mineral density (BMD) in ACLr individuals
Faculty Advisor: Christopher Powers
Background: Background: The remnant ACL is a subset of individuals with ACL tears who have undergone ACL reconstruction (ACLr). Methods: Nineteen individuals (9F, 23±7.0 yrs) 91±18 days post-ACLr without observable knee laxity participated. Surface electromyography (EMG) was used to measure muscle activity during gait. Results: The modified golf intervention (2 x weekly; 90 min) was associated with increased gait speed, improved cognitive performance, and reduced knee pain. Conclusion: The modified golf intervention may improve physical and cognitive demands of golf may improve physical and cognitive function in older adults.

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ABSTRACTS

Purpose: To investigate the importance of variability of movement as measure of stability in relation to knee valgus in children with and without knee valgus.

Methods: Knee valgus was measured from video data of infants performing a drop-jump task. Variability in movement was calculated as Coefficient of Variation and was compared with all subjects and between groups of children with and without knee valgus.

Results: Children with knee valgus exhibited higher variability in movement as compared to children without knee valgus. These differences were significant for both the group with and without knee valgus.

Conclusion: Variability of movement may be a useful measure of stability in children with knee valgus. Further research is needed to determine the clinical significance of these findings.
Title: Autism spectrum disorder (ASD) can be defined as a spectrum of neurodevelopmental disorders characterized by difficulties in social interaction, repetitive behaviors, and restricted interests and activities. ASD affects individuals of all ages and can manifest in different ways, ranging from mild to severe. The prevalence of ASD is estimated to be around 1% of the population, with a higher prevalence rate among boys than girls.

Background: ASD is a complex and multifaceted disorder that impacts various aspects of an individual's life, including social skills, communication, and learning. Research has indicated that early intervention is crucial in improving outcomes for individuals with ASD. However, there are challenges in delivering effective treatments due to the variability in symptom severity and the need for tailored approaches.

Objectives: The objectives of this study were to investigate the effectiveness of a specific intervention in improving social skills and communication in children with ASD. The intervention involved 30 sessions of sensory integration therapy (SIT) provided by trained therapists. The study aimed to assess the impact of SIT on the children's social skills and communication abilities.

Methods: The study included 30 children aged 3 to 6 years with a diagnosis of ASD. The children were randomly assigned to either the intervention group (n=15) or the control group (n=15). The intervention group received 30 sessions of SIT, while the control group received only the usual care. Pre-intervention and post-intervention assessments were conducted using standardized scales to measure social skills and communication abilities.

Results: The results showed a significant improvement in social skills and communication abilities in the intervention group compared to the control group. The effect size indicated a medium to large effect size, suggesting a clinically meaningful improvement.

Conclusion: The findings suggest that sensory integration therapy (SIT) can be an effective intervention for improving social skills and communication in children with ASD. Further research is needed to explore the long-term effects and to identify optimal implementation strategies.

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ABSTRACTS

throughout the analysis process for rehabilitation. Procedures for analyzing the data were rooted in an occupation-based approach for promoting patient-centered care. This study illustrates the barriers and strategies to deliver occupation-based activities in PAC as well as examine the extent to which such interventions contribute to achieving patient-centered care outcomes.

Poster # 130
Title: Enhancing client engagement through text messaging

Background: The use of text messaging in rehabilitation is categorized under telehealth, an emerging niche in occupational therapy involving the delivery of health care services through telecommunication and virtual technologies. Interventions that incorporate text messages have shown positive outcomes in health promotion and are recommended as an approach to help facilitate the development of health behaviors. Despite this research, occupational therapists continue to report low use of text消息 in clinical practice, and lack of skill to use such technology. Purpose: This study sought to identify the perceptions of using text messaging as a strategy to engage clients with diabetes in an occupation-based lifestyle intervention. Methods: A mixed-methods study was conducted, including a survey assessing the acceptability of using text messaging as an occupation-based intervention among people with diabetes. Results: The survey revealed high acceptability of using text messaging in promoting health behaviors, with a majority of participants indicating they would engage in such activities to receive audiographic feedback related to their therapy and to inform future practice by providing occupational therapy practitioners with an understanding of how text messages can be utilized to promote positive outcomes during therapy.

Poster # 131
Title: TGF-B signaling regulates gingival epithelial wound healing

Background: The transforming growth factor beta (TGF-beta) signaling pathway is involved in the regulation of cellular growth and differentiation. TGF-B signaling is critical in various health conditions and is essential for promoting healing of wounds. However, the role of TGF-B signaling in the repair of extraction socket with dehiscence defect is not well understood. Therefore, we aimed to determine whether restoring TGF-B signaling is a feasible strategy to enhance wound healing and would be effective in vivo.

Poster # 132
Title: Title: Deformity patterns in cleft-palate mice by using computational methods

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Poster # 133
Title: The role of Runx2 in craniofacial development

Background: Runx2, a transcription factor that regulates craniofacial development, is essential for the formation of cranial bones. Mutations in the RUNX2 gene are associated with various craniofacial malformations, including cleft lip and palate. The aim of our study was to assess the role of Runx2 in craniofacial development and to identify size differences in individual craniofacial structures among control and cleft palate mice.

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Title: Management of emergency department discharged school nurses
Name: Amiin Afshar
Faculty Advisor: Juleen Jenkins

Background: Dental pain is one of the most common reasons for people to be addressed in schools. Falls, fights, and sport injuries are some of the common causes of dental trauma in school. Purpose: The purpose of this study is to determine school nursing students’ knowledge/Skills to treat school nurses and health clerks. Methods: A two question survey was used and was administered to elementary and middle school nurses and health clerks separately. Their responses were used to determine their need for training to be addressed in schools.

Title: The potential of development in dental technology in USC dental students and health clerks
Name: Amrin Afshar
Faculty Advisor: Sondast Sundararman

Background: This study is a project of “Innovations for Dentistry” a student organization at USC. Dental students at USC have little knowledge regarding the developments in their field. As a part of their education, we decided to introduce them to the potential developments in dental technology. Material and Methods: A customized survey has been created and distributed to students. Results: A total of 10 students have filled out the survey. Discussion: As there are no previous studies on the potential developments in dental technology, the results cannot be compared to similar studies. The survey will be sent to engineering students in all classes in fall 2016. Another customized survey will be sent to engineering students in all classes in fall 2016. Two of these same disciplines.

Title: The potential in development of dental technology in USC Dental students and health clerks
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**title**: Conditional knockdown of Runx2 in the pre-natal and post-natal skull during the development of cranial neural crest (CNC) and its role in craniofacial morphogenesis

**Abstract**: We aimed to examine the role of Runx2 in the development of cranial neural crest (CNC) and its impact on craniofacial morphogenesis. We generated mice, in which Runx2 is knocked out in epithelial cells; muscle cells; CNC cells; and all cells. We found that the absence of Runx2 resulted in abnormalities in the craniofacial skeleton, particularly in the mandible and maxilla. Our findings suggest that Runx2 plays a crucial role in the development of the craniofacial skeleton and its absence results in severe craniofacial malformations. Further studies are needed to elucidate the molecular mechanisms underlying these defects and to understand the role of Runx2 in the development of the craniofacial skeleton.

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**Objective**: To investigate the role of Runx2 in craniofacial malformations.

**Materials and Methods**: We generated mice with conditional Runx2 knockdown in the craniofacial skeleton using different Cre-driver lines. We performed histological and genetical analyses to assess the effects of Runx2 knockdown on craniofacial development.

**Results**: We found that the absence of Runx2 resulted in abnormalities in the craniofacial skeleton, particularly in the mandible and maxilla. Our findings suggest that Runx2 plays a crucial role in the development of the craniofacial skeleton and its absence results in severe craniofacial malformations.

**Conclusions**: Runx2 plays a crucial role in the development of the craniofacial skeleton and its absence results in severe craniofacial malformations. Further studies are needed to elucidate the molecular mechanisms underlying these defects and to understand the role of Runx2 in the development of the craniofacial skeleton.
sults: Wnt1-Cre;Ift88fl/fl pups died at birth due to severe craniofacial defects including bilateral cleft lip and palate and tongue agenesis, following the loss of the primary cilia in the CNC-derived palatal mesenchyme. Loss of Ift88 also resulted in a decrease in neural crest cell proliferation during early stages of palatogenesis as well as a downregulation of the Shh signaling pathway in the palatal mesenchyme. Importantly, Osr2-KI-Cre;Ift88fl/fl mice exhibited isolated cleft palate.

Conclusion: Our results demonstrate that IFT88 has a highly conserved function within the primary cilia of the CNC-derived mesenchyme in the lip and palate region in mice, and is a strong candidate as an orofacial clefting gene in humans.

Poster #: 156
Title: Rapid HIV testing at the Herman Ostrow School of Dentistry
Name: Maile Osborne
Faculty Advisor: Piedad Suarez-Durall

Background: There are an estimated 1.2 million people in America living with HIV, and 13% did not know they were infected. Early detection can prolong one’s life quality, as well as decrease the spread of infection to others. Purpose: This study presents the results of rapid HIV testing at our dental school clinic. Methods: Patients waiting for a dental hygiene appointment were offered the opportunity of receiving a free HIV test using the patient’s oral fluid. Those declining the test were asked to complete an anonymous questionnaire collecting demographics and reason(s) for declining. The study was approved for human research (IRB #15-00287). Results: Of 810 patients surveyed, 492 people declined to receive the test citing just didn’t want test today (60.16%) and already been tested (12.2%). Of the 318 tested, 3 (0.94%) were reactive with 2 of those also positive and one refusing the 2nd test. There were no significant differences by gender between people accepting/declining the test, however patients declining the test were more likely to be older (p=0.008). Conclusion: The population seeking dental treatment in a dental school clinic are receptive to receiving a free rapid HIV test. The reactive rate of 0.94% in the school as compared to the 0.018% incidence rate in Los Angeles, indicates that testing for new undiagnosed patients is needed and that a dental school clinic provides an important non-traditional site for patients to be HIV tested.
Dear fellow students, faculty, and staff,

It is with great pride and honor that we present the ninth edition of The Explorer. It features new and innovative research being pursued at the Herman Ostrow School of Dentistry, the Mrs. T.H. Chan Division of Occupational Science and Occupational Therapy, and the Division of Biokinesiology and Physical Therapy at USC.

We would also like to congratulate all of our fellow classmates in their accomplishments this year through their efforts in research. We recognize the hard work and dedication these students have made to keep this university at the forefront of science and hope everyone has the opportunity to support them during the poster viewing session. In addition, from restorative dentistry to stem cell research, we hope the projects displayed today as well as the lectures given by our keynote speakers serve as inspiration to those interested in pursing research.

Lastly, we would like to thank everyone who has helped in organizing Research Day. It is the efforts of Dr. Yang Chai, Dr. Parish Sedghizadeh and the entire Research Day Planning Committee that have worked tirelessly to make today a success. We are also very fortunate to have an amazing group of writers, photographers, and leaders in Student Research Group without whom this journal would not be possible.

We hope everyone enjoys this issue of The Explorer and thank you so much for all the support.

Fight On!

Armin Afshar and Natalie Inoue

FROM THE EDITORS

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Lynn Matsumoto
Barbara Roddy
Raquel Saez
Bridget Samuels
Patricia Thompson