

RESEARCH SPOTLIGHT

TRANSLATING SCIENCE TO PRACTICE



Research Day 2016 Spotlights both Faculty, Student Research

PENN DENTAL MEDICINE brought faculty and students together to share their research activities with one another and spotlight the depth of the School's research enterprise at Research Day 2016, held May 12 at the Annenberg Center for the Performing Arts. This was the first year for a combined student and faculty research event, which created a venue for attendees to learn about research being conducted throughout the Penn Dental Medicine community.

"We felt that with the great research successes over the last years, it was time to celebrate and showcase the School's research in a more inclusive and complete manner," says Dr. Markus Blatz, Professor and Chair of Restorative Dentistry and Co-Chair of the Research Day 2016 Committee. "Penn Dental Medicine Research Day now embraces all aspects and levels of research activities in the School, showcasing the great accomplishments to all our faculty, students, residents, alumni, and industry partners."

The day included a program of presentations by faculty and two invited keynote

speakers, along with 126 poster presentations, representing DMD-student, postdoctoral-candidate, and faculty research. Presenting faculty highlighted recent high-impact publications in both the basic and clinical sciences and included

"Students, research assistants, and postdocs can find techniques and approaches that their research neighbors are using and get help in applying them to their own work."

— DR. DANA GRAVES

"Oral delivery of protein drugs bioencapsulated in plant cells - clinical translational studies" by Dr. Henry Daniell, Professor and Interim Chair, Dept. of Biochemistry; "Epithelium regulates connective tissue wound healing mediated by FOXO1" by Dr. Dana Graves, Professor and Interim Chair, Dept. of Periodontics; "DEL-1 restrains osteoclastogenesis and inhibits inflammatory bone loss in nonhuman primates" by Dr. George Hajishengallis, Professor, Dept. of

Microbiology; "C. albicans and S. mutans: a synergistic cross-kingdom alliance involved in early childhood caries" by Dr. Michel Koo, Professor, Dept. of Orthodontics and Divs. of Pediatric Dentistry and Community Oral Health; "Hybrid degradation pathways are necessary for the clearance of intracellular debris in the maintenance of visual function" by Dr. Kathleen Boesze-Battaglia, Professor, Dept. of Biochemistry; and "Basis and consequences of periodontal disease susceptibility" by Dean Denis Kinane, Professor, Depts. of Periodontics and Pathology.

Invited keynote speakers were Dr. Thomas Wynn, Senior Investigator and Chief of the Immunopathogenesis Section of the Laboratory of Parasitic Diseases within the NIH/NIAID, speaking on "Molecular and Immunological Mechanisms of Fibrosis" and Dr. Irena Sailer, Head of the Division of Fixed Prosthodontics and Occlusion, University of Geneva, who talked on "Veneered or Monolithic? New Concepts in Restorative Dentistry."

A strong representation of the current research throughout the School was featured in the poster presentations, which along with faculty and postdoctoral-candidate posters, included 98 student projects from the Summer

Research Program, the School's five honors programs (research, community health, clinical, oral medicine, and radiological sciences), and the Bridging the Gaps community-internship program. A faculty panel judged the Summer Research Program and Bridging the Gaps posters, presenting first through third-place awards from each group. The 2016 Joseph and Josephine Rabinowitz Award for Excellence in Research was also presented.

In addition, student and young investigator research was recognized with the selection of 10 DMD students as recipients of the 2016 AADR Travel Grants and six individuals representing Master of Science in Oral Biology and Doctor of Science in Dentistry residents and junior investigators. The AADR Travel Grant program was launched by Penn Dental Medicine in 2014 to build opportunities to advance ongoing research and leadership among students and junior researchers; this year's recipients will attend and be encouraged to present their work at the 2107 IADR/AADR/CADR General Session to be held in San Francisco in March.

An event like Research Day can help advance research within the School in a number of ways, notes Dr. Dana Graves, Vice Dean for Research and Scholarship. "Research Day is a wonderful opportunity for faculty to learn what is being done in other labs that could lead to future joint projects," says Dr. Graves. "In addition, students, research assistants, and postdocs can find techniques and approaches that their research neighbors are using and get help in applying them to their own work. It's a great day of exchange."

Research Day 2017 will be held May 11, leading into Alumni Weekend 2017, May 12-13. "We encourage alumni to join us," adds Dr. Michel Koo, Co-Chair of the Research Day 2016 Committee. "It is a unique opportunity to hear about research across all disciplines at Penn Dental." ■

Rabinowitz Award

The Joseph and Josephine Rabinowitz Award for Excellence in Research is presented annually to Penn Dental Medicine investigators. The endowed award was established by the Rabinowitz family in 2002 to support and encourage independent research. This year's award recipients, presented at Research Day 2016 include:

Dr. Manju Benakanakere, *Research Assistant Professor, Dept. of Periodontics*

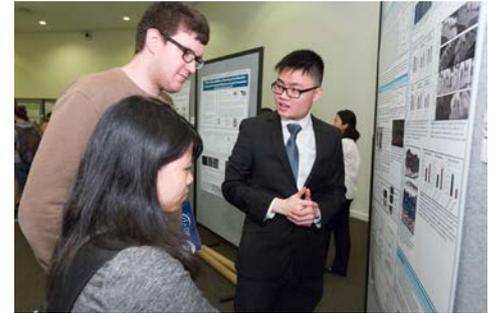
The goal of Dr. Benakanakere's project is to develop nanoparticle-based strategies for HPV-associated oral squamous cell carcinoma treatment. Nanoparticles will be engineered to covalently link a monoclonal antibody to specifically target cancer cells, but not healthy cells. He will test the efficacy of engineered nanoparticles in a humanized mouse model of HPV-associated nasopharyngeal carcinoma.

Dr. Baomei Wang, *Senior Research Investigator, Dept. of Microbiology*

Innate lymphoid cells are found at mucosal surfaces of the body, where they regulate immunity, inflammation, and tissue repair. The goal of Dr. Wang's project is to understand the role of innate lymphoid cells in inflammatory diseases associated with a major immune deficiency (leukocyte adhesion deficiency) and develop rational therapeutic approaches.

Summer Research Program Winning Posters

Following are highlights of the winning research posters awarded at Research Day 2016 to students who participated in the 2015 Summer Research Program.



Inflammation Alters Mesenchymal Stem Cells to Cause Connective Tissue Anomalies

Anh Thieu Nguyen (D'18) was awarded first place for this study, conducted with preceptors Dr. Dana Graves, Professor and Interim Chair, Dept. of Periodontics, and Dr. Kang Ko (D'15, GD'18)

Mesenchymal stem cells (MSCs) are capable of differentiating into cells that form bone, cartilage, skin, and more. While it is known that inflammatory signaling affects MSCs, its impact in development is not known. This study was designed to examine the impact of inflammation on MSCs during development. Mice bred with a mutation that blocked MSCs from responding to inflammation showed a small, but statistically significant decrease in bone lengths (tibia, ulna, and humerus). Interestingly, they had a significant thickening of the connective tissue layer of the skin with a corresponding decrease in the underlying fat tissue layer. It was concluded that inflammatory signals during development play a role in regulating MSCs and proper development of skin and the underlying fat layer in adult mice. This suggests a novel mechanism in which inflammation favors formation of fat tissue (adipogenesis), while inhibiting formation of dense connective tissue (fibrogenesis).



Autophagy in Response to Aggregatibacter actinomycetemcomitans and LtxA

Nishat Shahabuddin (D'18) was awarded second place for this study, conducted with preceptors Dr. Edward Lally, Professor, Dept. of Pathology; Dr. Kathleen Boesze-Battaglia, Professor, Dept. of Biochemistry

Localized Aggressive Periodontitis (LAP) is a form of periodontal disease that affects young patients, producing bone and attachment loss around the permanent incisors and first molars. It is strongly associated with certain clones of *Aggregatibacter actinomycetemcomitans* (Aa) and its major virulence factor, a 114kDa cytotoxin (leukotoxin, LtxA). Our studies demonstrated a robust, reproducible immune response to LtxA in individuals with LAP compared to periodontally healthy individuals. In addition, in vitro studies showed that Aa, like other oral pathogens such as *Porphyromonas gingivalis* (Pg), modulates autophagy, the process of intracellular recycling.

Persistent Infection of Oral Mesenchymal Stem Cells by KSHV and its Role in Kaposi's Sarcoma Development

Ross Rosenblatt (D'18) was awarded third place for this study, conducted with preceptor Dr. Yan Yuan, Professor, Dept. of Microbiology

The oral cavity is the first site that Kaposi's Sarcoma Herpes Virus (KSHV) manifests, but it is not clear which cells KSHV initially infects within the mouth. The Yuan lab hypothesizes that KSHV first infects mesenchymal stem cells. By isolating the virus and infecting human oral mesenchymal stem cells, such as periodontal ligament stem cells (PDLSCs,) the Yuan lab hopes to prove that KSHV infects human mesenchymal stem cells and uses these cells as a reservoir during infection. Having a greater understanding of how KSHV works would not only be significant in understanding this AIDS-associated malignancy, but it would also prove useful in future treatment and management of the disease. Initial results are encouraging.

As the first place winner, Nguyen presented his research as part of the Student Clinician Research Program of the ADA during the ADA 2016 meeting in Denver. And both Shahabuddin and Rosenblatt presented their projects at the 2016 Hinman Student Research Symposium, held in Memphis, Tenn.

Bridging the Gaps Project Winners

Following are highlights of the winning project posters awarded at Research Day 2016 to students who participated in the 2015 Bridging the Gaps community-internship program.

Health Federation Early Head Start Program

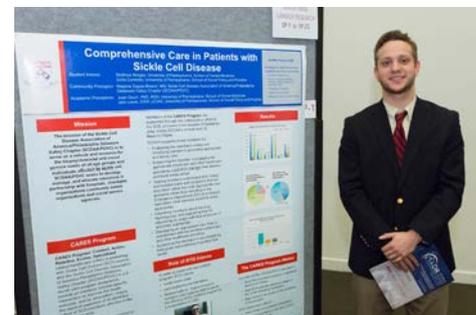
Rebecca Dresner (D'18) was awarded first place for her project at Health Federation Early Head Start Program with Britainy Stephens, Penn's School of Social Policy & Practice

As part of the Early Head Start Program team for the summer, Dresner and Stephens collaborated on developing a variety of information sessions, addressing the topics of mental health, postpartum depression, oral health, dentistry, and vaccination. They also created an interactive poster on maternal and infant cardiovascular health and participated in fire-and-safety and child-abuse-reporting trainings, creating a "disaster preparedness" video for the Health Federation website and planning a mock drill. In addition, they developed and administered CPR and first aid surveys of the Health Federation families. As a dental student, Dresner also assisted in providing dental screenings and advised parents on oral health.

Comprehensive Care in Patients with Sickle Cell Disease

Matthew Breglio (D'18) was awarded second place for his project at the Sickle Cell Disease Association of America Philadelphia/Delaware Valley Chapter with Sofia Commito, Penn's School of Social Policy and Practice

Breglio and Commito, in coordination with the Sickle Cell Disease Association of America/Philadelphia Delaware Valley Chapter, completed a six-month pilot program in partnership with United Healthcare (UHC). The program,



known as the "CARES Program," was designed to provide an intensive disease-specific intervention to improve health outcomes, and by association, reduce the medical expenses of an identified cohort of UHC members with sickle cell disease. The interns made home visits to patients, participated in exit interviews, and worked with the medical director to gather and organize data in both the field and within the healthcare system. Their data demonstrated that the pilot program successfully saved more than \$100,000 in medical expenses, while substantially improving the quality of care provided to the members of the sickle cell cohort.

Beauty is More Than Skin Deep: A Day of Pampering and Women's Wellness

Meghan Pandya (D'18) was awarded third place for her project at Sayre Health Center with Casey Baginski, Penn's School of Social Policy and Practice & Master of Public Health Program

The goal of their project was two-fold — to reduce unplanned pregnancy by providing information about contraceptive methods and to make women aware of the community services available to support healthy pregnancy and child development. As a means of sharing this information in a fun and appealing way, Pandya and Baginski hosted a spa day and wellness event to engage young women of child-bearing age to the Sayre Health Center in West Philadelphia. They collaborated with area manicurists, massage therapists, and hairdressers to provide their services at the event, while Pandya and Baginski provided information on contraception and community resources designed to help expectant/new mothers.