

AADR TRAVEL AWARD PROGRAM

CULTIVATING THE NEXT GENERATION OF DENTAL RESEARCHERS

WHEN THE AMERICAN ASSOCIATION for Dental Research (AADR) meets in Vancouver in June, 16 dental students and junior researchers from Penn Dental Medicine will have the opportunity to present their research projects at the prestigious conference with support from the School's AADR Travel Award Program.

The Penn Dental Medicine researchers will be presenting on topics ranging from the impact of diabetic complications on wound healing to the connection between abnormal oral microbe communities and end-stage lung disease.

"This is a unique opportunity for selected students and research fellows not only to present research to their peers and to top dental scientists at this premier dental research meeting, but also to network with them," says Dr. Hyun Koo, Professor, Department of Orthodontics and Divisions of Community Oral Health and Pediatric Dentistry at Penn Dental Medicine.

Dr. Koo has been serving as Chair of Research Day, an annual showcase highlighting the quality, depth, and diversity of the Penn Dental Medicine research enterprise, at which the AADR Travel Award winners are selected.

"The travel awards program was created to advance ongoing research and leadership for students and investigators at Penn Dental Medicine and to showcase the research prowess of Penn Dental Medicine," he says. "The AADR meeting is the premier dental research meeting in North America and attracts top dental scientists from around the world."

THE IMPACT OF THE TRAVEL AWARDS

Since the AADR Travel Award Program was established in 2014, a total of 74 dental students and junior researchers have received assistance to attend and present at the annual meeting. This year, the AADR is meeting in conjunction with the Canadian Association for Dental Research and the International Association for Dental Research, providing an even larger, international audience for those presenting.

Another sign of the program's success is that the number of presentations at Research Day has increased from 28 to 135 between 2014 and 2018.

By providing an opportunity to participate at a high-level research conference, the travel awards program encourages students to think more broadly about their futures, says Dr. Dana Graves, Vice Dean for Research and Scholarship at Penn Dental Medicine.

"Many academic careers in dentistry begin with a laboratory research experience and presentation at a national meeting," he explains. "This is a wonderful opportunity to inspire dental students to think of a career that goes beyond clinical practice. It is also

advantageous for Penn Dental Medicine. Our reputation depends on an active research program, and one of the best ways to reinforce our position as a top dental school is by showcasing the excellent research done by our students."

Some examples of the impact of the AADR Travel Awards include 2016 recipient Mohammed Alharbi (GD'14, DScD'17), who won second place in the senior basic science category of the IADR Unilever Hatton Competition, and 2017 recipients Saro Atam (D'18) and Justine Chiou (D'19) who received the 2018 AADR Bloc Travel Grant. Dongyeop Kim, a postdoctoral fellow at Penn Dental Medicine, was a finalist for the 2018 AADR Joseph Lister Award for New Investigators, a prestigious competition for junior investigators sponsored by the AADR and CADR.

"One of the rewards of participating in a rigorous research project is the opportunity to present the results to peers and colleagues," Dr. Graves notes. "For many, it is a new experience and an inspirational one. The research provides an enriched and more diverse educational experience for our students and opens doors for them."

The 2019 Research Day will be held May 16 with Dr. Frank Setzer, Assistant Professor of Endodontics, as the new Chair. The AADR Travel Award Program was initially funded by Penn Dental Medicine's Research Incentive Fund Committee, with additional support starting in 2016 from Dentsply Sirona and Johnson & Johnson, allowing for an increase in the number of annual awards.

OPPOSITE: The School's AADR Travel Awards are presented annually at the School's Research Day. Since 2014, a total of 74 dental students and junior researchers have received assistance to attend and present at the AADR Annual Meeting through the program.

TRAVELAWARDS

At Research Day 2018 last May, 16 Penn Dental Medicine students and junior researchers received AADR Travel Awards to present their research this June at the annual meeting of the American Association for Dental Research, which this year is meeting jointly with the Canadian Association for Dental Research (CADR) and International Association for Dental Research (IADR). The large international gathering will attract many of the world's top dental researchers.

Following is a closer look at four of the emerging Penn Dental Medicine researchers who received the AADR travel awards to attend this joint meeting in Vancouver.



MILO JINHO YU (D'20)

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Penn Dental Medicine student Milo Jinho Yu (D'20) will be traveling to his hometown of Vancouver in June to present his research on how certain toxins contribute to localized aggressive periodontitis, for which he received an AADR Travel Award.

Yu's research was done after his first year as part of the Summer Research Program, when he worked in the laboratory of Dr. Bruce J. Shenker, Professor in the Department of Pathology. Yu's undergraduate background in microbiology and immunology made him a good match for Dr. Shenker's lab. "I thought it would be a good opportunity whether I decide to pursue a career in research or private practice," Yu says. "I learned the importance of evidence-based dentistry, understanding bias, and how studies are done."

"The Travel Award Program encourages students to seek out mentorships and have a chance to experience first-hand dental research."

— MILO JINHO YU (D'20)

For his project, titled "Escherichia Coli Cytolethal Distending Toxin Toxicity on Macrophages is Dependent on Cellugyrin," Yu used E. coli as a model to study how toxins in the *Aggregatibacter actinomycetemcomitans* contribute to localized aggressive periodontitis, which is characterized by rapid alveolar bone loss.

These bacteria, along with several others, produce toxins that can lead to cell death in lymphocytes or an inflammatory

response in macrophages in the mouth. Yu's research goal was to determine whether a protein called cellugyrin is necessary to help the toxins do their damage. Studying two macrophage cell lines, Yu found that the cell line without cellugyrin indeed produced much less inflammatory response.

Yu says presenting his research at the conference "is a fantastic opportunity to learn about the most current dental research and where it's going in the future. Not only will I get the chance to present my poster," he says, "but I will be able to learn about research coming from other institutions all over the world, as well as attend lectures by renowned researchers that will enhance what I have learned at Penn Dental Medicine."

Yu recommends that dental students consider opportunities in research even if they're not sure they want to pursue a career in academic dentistry.

"I think the Travel Award Program encourages students, including those without much previous research experience, to seek out mentorships and have a chance to experience first-hand dental research," Yu says. "The process of coming up with an abstract, doing research, making the poster and presenting the findings is a great experience for everyone."

GRACE CHUNG, D'20

Antiretroviral therapy has helped significantly prolong survival for many infected with human immunodeficiency virus (HIV), but these life-saving drugs may also contribute to the neurocognitive disorders that affect about half of HIV-positive patients.

As a participant in Penn Dental Medicine's Summer Research Program, Grace Chung (D'20) learned that chronic stress from HIV-associated neurocognitive disorders, or HAND, may trigger a stress response leading



GRACE CHUNG (D'20)

And, importantly, the exposure to other dental researchers has fostered her interest in treating more medically complex cases and encouraged her to pursue the School's honors program in oral medicine, she says, "so I can treat patients who are traditionally not admitted for routine care."

Chung credits the Summer Research experience with providing the skills and knowledge to carry out the research and share the results to experts from around the world. "Working with Dr. Jordan-Scuitto and Dr. Cagla Akay-Espinoza and their team was a great experience," she says. "They taught me that, without research, medicine will remain stagnant. It is the high-caliber research carried out by my mentors that makes me proud to display the Penn Dental Medicine emblem on my research posters."



DR. AUREA SIMON-SORO

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Dr. Aurea Simon-Soro's interest in how microbial interactions affect oral health and disease, as well overall systemic health, started when she was a DMD student in her native Spain. As her knowledge of microbiology, immunology, and clinical experience increased, so did her curiosity about the cause of dental caries, leading to an award at the Spanish Dental Student Meeting for her work on bio-film patterns on various dental materials.

While earning a PhD in dentistry, she co-invented and received a patent for a caries risk assessment tool, the Salivary Immune and Metabolic Marker Analysis test, which evaluates salivary immune components, buffering capacity, and affinity of microbial adhesion.

Now in the Biomedical Postdoctoral Program at the University of Pennsylvania, Dr. Simon-Soro received an AADR Travel Award to present her research on the effect of oropharyngeal microbes in lung transplant patients, based on her work last year in the laboratory of Dr. Ronald Collman, Professor of Medicine and Microbiology at Penn's Perelman School of Medicine, and Director of the Penn Center for AIDS Research.

to over-activation of the PERK protein, which can result in neuronal damage. Her research focused on whether blocking PERK might protect those neurons from damage.

Working under the tutelage of Dr. Kelly Jordan-Scuitto, Professor and Chair of Pathology, and Dr. Cagla Akay-Espinoza, Research Assistant Professor of Pathology, Chung experimented on rat neurons to determine the impact of time and dose-dependent activation of the PERK protein on neuron loss.

"And indeed, our data suggest that pharmacologic PERK inhibition is a potential

mechanism for decreasing the neuronal damage of HAND," Chung explains. "What I find most exciting is that our project will set the groundwork to determine if HIV-positive patients may benefit from drugs that target PERK."

The project, which she presented at Research Day 2018, earned Chung an AADR Travel Award to present the research this June at the combined AADR/IADR/CADR meeting and encouraged her to present her research at other conferences as well, including the Greater New York Dental Meeting in November.

Her research showed that the abnormal oral microbe communities in patients with end-stage lung disease normalized for up to about six months after a lung transplantation, but then reverted to the abnormal levels similar to those before the transplant. Referencing the connection between the abnormal microbes in the mouth and in the lungs, she notes, “whatever is happening in the oral cavity can also affect the rest of the body.”

Currently, Dr. Simon-Soro is working in the Penn Dental Medicine laboratory of Dr. Hyun (Michel) Koo, Professor, Department of Orthodontics, Divisions of Community Oral Health and Pediatric Dentistry, where she is applying skills in bioinformatics, microbiome analysis, and biofilm imaging. At this year’s Research Day, she will present her latest study on early childhood caries, which she said affects 23 percent of children. She is researching the interaction of oral fungi and bacteria in saliva related to environmental factors, such as sugar intake, and how it affects the development of virulent dental plaque in early childhood caries.

For Dr. Simon-Soro, the postdoctoral research experience at Penn underscores her ultimate goal. “My future is in basic research, that is what I want to do,” she says, noting that the AADR Travel Award will further that goal. “Presenting my research findings at the AADR meeting not only allows me to share the investigation that I am doing, but also to evolve scientifically through interaction and networking with the dental scientific community.”

DR. KANG KO, D’15, GD’20, DSCD’20

Dr. Kang Ko (D’15, GD’20, DScD’20) knew early on that research would be an integral part of his career, and he has worked toward that goal throughout his dental education, including his DMD degree, his residency in periodontics, and concurrent pursuit of a Doctor of Science in Dentistry — all at Penn Dental Medicine.

During this time, his overarching research interest has been to understand how diabetes can complicate wound healing by interfering with mesenchymal stem cells, working under the mentorship of Dr. Dana Graves, Professor, Department of Periodontics.



“[AADR] is an ideal place for me to meet with experts to discuss and share research findings and interact with future colleagues.”

— DR. KANG KO (D’15, GD’20, DSCD’20)

“This is an exciting field of research with important clinical relevance, as it combines stem cell biology and immunology,” Dr. Ko says. “Stem cell therapy offers promising regenerative outcomes in periodontics and orthopedics, however, its predictability may vary greatly in patients with diabetes.”

In his latest study, for which he received an AADR Travel Award, Dr. Ko found that inhibiting a mechanism in the stem cells prevented the chronic inflammation that often impedes fracture healing in diabetic patients. As a potential clinical solution, Dr. Ko says, the findings could be extended to other disease models where persistent inflammation is linked to organ damage, such as rheumatoid arthritis.

His interest in research was clear early on; he participated in the Summer Research Program after his first year at Penn Dental

Medicine, with Dr. Graves as his adviser, and then entered the research honors program. This is the second AADR Travel Award he’s received from Penn Dental Medicine, and he’s also been awarded the 2018 AAP Education Scholarship from the American Academy of Periodontology Foundation and the Mentored Clinical Scientist Research Career Development Award from National Institute of Dental and Craniofacial Research.

Attending the AADR conference, he says, has helped him acquire the knowledge and experience to further develop as a researcher. “It is an ideal place for me to meet with experts to discuss and share research findings and interact with future colleagues,” Dr. Ko says. “Every researcher investigates a unique set of questions. Learning their innovative approaches and adopting them for my own topic of research is particularly helpful.”

Dr. Ko plans to pursue an academic career combining clinical practice, education, and research, and to continue to investigate how inflammatory conditions affect stem cell behavior in the oral cavity and bone. “Ultimately,” he says, “I hope that my work will contribute to advanced therapies to help patients with systemic diseases.” ■

— By Debbie Goldberg

2018 AADR TRAVEL AWARD RECIPIENTS

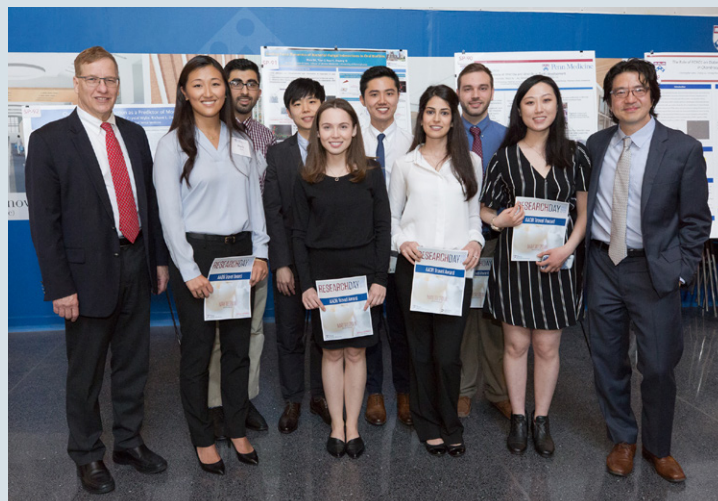
Sixteen dental students and junior researchers from Penn Dental Medicine were awarded AADR Travel Grants in 2018 and will present their work at the upcoming AADR/IADR/CADR Annual Meeting in Vancouver in June — the recipients, their research projects, and faculty advisors follow.

DMD STUDENT AWARDEES

Student/Project	Faculty Advisor
Grace Chung (D'20): <i>Role of PERK in HIV-Associated Neurocognitive Disorders</i>	Kelly Jordan-Sciutto Dept. of Pathology
Sahil Gandotra (D'20): <i>Determining the Immunologic Profile of Primary HSV-1 Infection in Humans</i>	Gary Cohen Dept. of Microbiology
Richard M. Kralik (D'20): <i>NF-κB Promotes Mesenchymal Stem Cell Apoptosis and Inhibits Proliferation in Diabetic Fractures</i>	Dana Graves Dept. of Periodontics
Iryna A. Mysnyk (D'20): <i>Inhibition of Human Mast Cell MRGPRX2 Signaling Involved in Chronic Urticaria and Periodontitis</i>	Hydar Ali, Dept. of Pathology
Noor Q. Omar (D'20): <i>Regulation of MrgX2/Gα4q Interaction in MCs by GRK2 and its RH Domain</i>	Hydar Ali, Dept. of Pathology
Christopher M. Sohn (D'20): <i>The Role of FOXO1 on TGFβ1 Expression in Chondrocyte</i>	Dana T. Graves Dept. of Periodontics
Sherry X. Wan (GEN'19, D'20): <i>Binding Force Dynamics of Bacterial-Fungal Interactions in Oral Biofilms</i>	Geelsu Hwang Dept. of Orthodontics
Milo Jinho Yu (D'20): <i>Escherichia Coli Cytolethal Distending Toxin Toxicity on Macrophages is Dependent on Cellugyrin</i>	Bruce Shenker Dept. of Pathology

GRADUATE DENTAL EDUCATION STUDENT AWARDEES

Student/Project	Faculty Advisor
Hanadi M. Alyami (GD'17, GD'18): <i>NOD1/NOD2 Upregulation in Fusobacterium Nucleatum Induced NETosis</i>	Denis Kinane, Former Dean
Sarah E. Bond (GR'22): <i>PERK Haplotype Functions in HIV-Associated Neurocognitive Disorders</i>	Kelly Jordan-Sciutto Dept. of Pathology
Zachariah W. Cole (D'17, M'20, GD'23): <i>Nasal Reconstruction with Paramedian Forehead Flap – Case Report</i>	Neeraj Panchal, Dept. of Oral & Maxillofacial Surgery/ Pharmacology
Kang I. Ko (D'15, GD'20, DSCD'20): <i>Inhibition of NF-κB in MSCs Prevents Chronic Inflammation in Diabetic Fracture Healing</i>	Dana Graves Dept. of Periodontics



ABOVE: The recipients of the 2018 AADR Travel Grants Awards with Dr. Dana Graves, Vice Dean for Research and Scholarship (left), and Dr. Michel Koo, Chair of Research Day 2018 (right), at the awards presentation at Research Day 2018.

JUNIOR RESEARCHER AWARDEES

Junior Researcher/Project	Research Lab
Xinhua Li: <i>Ciliary IFT20 and IFT80 are Required for Intervertebral Disc Development and Maintenance</i>	George Hajjishengallis Dept. of Microbiology
Jormay Lim: <i>IFT20 Regulates the Cell Alignment in Osteogenesis through Ceramide-PKCε/ζ Signaling</i>	Shuying (Sheri) Yang, Dept. of Anatomy & Cell Biology
Manunya Nuth: <i>Poxvirus Antiviral: Protein-Targeted Degradation by Small Molecules as a Design Strategy</i>	Robert Ricciardi Dept. of Microbiology
Aurea Simon-Soro: <i>An Aberrant Oropharyngeal Microbiome in Lung Transplantation Dominated by Facultative Anaerobes</i>	Hyun (Michel) Koo Dept. of Orthodontics & Divs. of Community Oral Health & Pediatrics

The 2019 AADR Travel Grant Awards will be presented at Penn Dental Medicine's Research Day 2019 on May 16, 2019.