

IGS Faculty Co-Mentors Student Winner of AMA Research Challenge

--Bioinformatics and Microbial Genomics Focused Research is Top Paper out of Over 1000 Submissions

Baltimore, December 20, 2022— The 2021 "Research Challenge of the American Medical Association (AMA)" initiative received 1,100 research projects to be evaluated. This is the largest national multidisciplinary research competition in the United States for medical students, residents, and fellows. Among these projects, the research developed by Marielisa Cabrera Sánchez, a second-year student at the School of Medicine of the Medical Sciences Campus (RCM) of the University of Puerto Rico (UPR), was recognized as the top paper out of all of the submissions.

This year the Challenge was very competitive – the AMA received over 1100 submissions, invited 800 to submit posters, selected 50 semi-finalists for short talks and invited five finalists for the ultimate event.

Marielisa's research, entitled "Genomic Adaptation of *Moraxella catarrhalis* During Persistence in the Airways of Chronic Obstructive Pulmonary Disease Patients," studies Chronic Obstructive Pulmonary Disease (COPD), which is the third leading cause of death worldwide.

She singlehandedly implemented bioinformatics analyses to identify novel changes in surface antigens of *Moraxella catarrhalis* during bacterial persistence in the lungs of COPD patients, informing ongoing and future vaccine development efforts. She participated in an NIH-funded T35 grant with two mentors from two different medical schools as part of her research.

"We studied how *Moraxella catarrhalis* adapted while persisting in the airways of COPD patients. We identified the genes that were most altered and discovered the exact genomic mechanism by which these alterations are made," said Marielisa Cabrera Sánchez. "The importance of our findings is that they reflect how *Moraxella catarrhalis* is adapting in vivo, while in the airways of COPD patients, contrary to previous studies done in vitro. These novel observations help determine which antigens may or may not be good targets for the development of therapeutics and vaccines, which will ultimately increase the quality of life of COPD patients and decrease mortality."

Her two mentors were Dr. Timothy Murphy, SUNY Distinguished Professor at the University of Buffalo, the State University of New York, an expert in microbiology and COPD, and Dr. Hervé Tettelin, Professor of Microbiology & Immunology at the Institute for Genome Sciences at the University of Maryland School of Medicine, a leading expert in bioinformatics and microbial genomics. Due to the quarantine, Marielisa's summer internship and the co-mentoring work was done remotely.

“It has been a most rewarding experience remotely mentoring Marielisa. She embraced the challenge of big genomics data bioinformatics with ease and remarkable dedication, making novel discoveries that set the path for potential new therapeutics against COPD. These results, combined with her exemplary data integration and presentation skills, set a distinguished paper”, said Dr. Tettelin, IGS.

“What a great project this turned out to be as a collaboration across three institutions,” said Dr. Murphy. “Keys to the project’s success were the impressive determination and rapid learning of new skills by Marielisa and Dr. Tettelin’s inspiring ability to mentor and teach bioinformatics to analyze bacterial genomes.”

Marielisa’s experience was supported by a T35 training grant “Training the Next Generation of Physician Scientists” to the University at Buffalo. The program hosts medical students from the University of Puerto Rico through a partnership between institutions.

The AMA Research Challenge judges spoke about the sophistication of Marielisa’s research, her understanding of the genomic tools that she employed and the quality of her mentoring. Her research is part of work that will help identify new therapies and vaccines for bacterial infection in COPD.

For the link to the AMA final event: <https://youtu.be/EV8x5-fa3MM>

And a follow-up interview with AMA: <https://youtu.be/42heADeBTak>