



Public Health Student Wins Award for Presentation Linking Toenails to Carcinogens in Firefighters

A pilot project from the Firefighter Cancer Initiative at Sylvester Comprehensive Cancer Center at the University of Miami Miller School of Medicine may help identify first responders who have been exposed to dangerous heavy metal carcinogens.



Alberto Caban-Martinez, Ph.D., D.O., M.P.H. (left), and M.P.H. candidate Alex C. Stewart

“Firefighters are exposed to a wide range of known or suspected carcinogens while on the job, and heavy metal exposure is a particular source of concern,” said Alex C. Stewart, an M.P.H. candidate in the Department of Public Health Sciences.

Stewart received a second-place award at the American Public Health Association’s Occupational Health and Safety scientific session as the lead author for the study, “Heavy Metal Exposure Assessment (HEAT) using Toenail Clippings in Firefighters: Evidence from the Firefighter Cancer Initiative.” He was recognized at the APHA’s Annual Meeting and Expo and 150th anniversary celebration.



The firefighters pilot project examined the use of toenails as biomarkers of long-term heavy metal exposure in firefighters, as well as the presence and quantity of heavy metals found in individual firefighters.

“The toenails we collected were analyzed for the concentration of five heavy metals – chromium, lead, cobalt, arsenic, and cadmium – through inductively coupled plasma mass spectrometry,” said Stewart. Firefighters also completed a questionnaire that included demographic and occupational backgrounds.

Analyzing Firefighters’ Exposure to Heavy Metals

Collecting toenails had high approval rates from participating firefighters, added Stewart. He noted this method is less invasive and easier to collect and store than other collection techniques, such as blood or urine samples.

“Identifying ways to characterize and monitor long-term exposures to heavy metals among firefighters, particularly for metals associated with cancer development, is important,” said Alberto Caban-Martinez, Ph.D., D.O., M.P.H., deputy director of Sylvester’s Firefighter Cancer Initiative and associate professor of public health sciences at the Miller School of Medicine.

Working collaboratively with Shanta Dhar, M.D., associate professor in the Miller School’s Department of Biochemistry and Molecular Biology, and Bapurao Surnar, Ph.D., a postdoctoral fellow in the department, Stewart and Dr. Caban-Martinez were able to translate key basic science principles



to real-world application at the firefighter station.

“In this scientific presentation, we used statistical models to determine if the job roles firefighters performed at fire scenes, such as a driver, an interior firefighter, management, or multiple roles, had an effect on the levels of heavy metals found in their nail samples,” said Stewart. “We found that firefighters who reported performing multiple roles at fire scenes were more than twice as likely to have excessive exposure to chromium when compared to their peers who specialized in singular roles,” he concluded.

Dr. Caban-Martinez added that the findings from the pilot project suggest that how active and involved firefighters are at a fire scene and the number of roles they perform there are significant factors to consider in future research related to carcinogenic exposures.

Other Miller School collaborators on the study included Kevin Griffin, M.P.H.; Paola Louzado-Feliciano, M.S.; Katerina M. Santiago, M.P.H.; Natasha Schaeffer-Solle, R.N., Ph.D.; Johanna Garibaldi; and Erin Kobetz, Ph.D., M.P.H.

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