

## BUSPH Doctoral Student Wins Recognition for Army Jet Fuel Research Project

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There's nothing quite like the pungent smell of jet-propulsion fuel in an Air Force hangar to get an environmental-health researcher's adrenaline pumping.

"Walking in the hangar -- wow, it's really strong. You realize how volatile it is," Kristen Weida Smith, a doctoral student and research analyst in BUSPH's Environmental Health Department, says of a research project that has taken her to an Air Force base in the Midwest to collect data on jet-propulsion fuel exposure. "Over 1 million people in the U.S. are occupationally exposed to this every year. But there's not a whole lot of research on it."

Smith, MPH '06, is part of a research team, led by the US Army Research Institute of Environmental Medicine (USARIEM), that is wrapping up a study on exposure to jet-propulsion fuel and neurological health in military personnel. The study, led by Susan P. Proctor of USARIEM, who is also research associate professor of Environmental Health at BUSPH, is looking at neurological health outcomes for personnel working both directly and indirectly with jet-propulsion fuel JP-8, the primary fuel currently used by the U.S. military.

Michael McClean, assistant professor of Environmental Health, is a co-investigator on the study and Smith's advisor. He designed and oversees the exposure-assessment piece of the project.

In October, Smith won an award from the International Society of Exposure Analysis (ISEA) for a student poster about the study. The award, given at the joint ISEA/International Society for Environmental Epidemiology conference, recognizes outstanding research conducted by a student in the area of human exposure science. At the conference, Smith also gave an oral presentation on the study.

Smith began working on the project, for her dissertation, two years ago. She had done previous research for Proctor on a study looking at the effects of military deployments on neuropsychological functioning.

She said the JP-8 research has been a good fit for her, given her interest in exposure assessment and environmental epidemiology, and that it's been a bonus to work for Proctor, who was the first doctoral graduate from BUSPH's Environmental Health program, in 1992.

The jet-fuel study is designed to examine whether repeated daily exposure to JP-8, a newer fuel blend, is associated with adverse

health effects, such as nervous system impairment. In 2003, a report by the Committee on Toxicology of the National Research Council found that JP-8 was "potentially toxic" to the immune system, respiratory tract and nervous system at high exposures -- higher than the Air Force's permissible occupational exposure limits. The committee recommended further studies on the health effects of inhalation and dermal exposure to JP-8.

Smith was involved in collecting and analyzing data on exposure -- a process that entailed outfitting military personnel with personal air pumps and adhesive strips on the skin. Personnel were divided into three groups, based on the likelihood of JP-8 exposure in their jobs: a high-exposure group (fuel-systems maintenance workers, some who work inside fuel tanks); a moderate-exposure group (re-fueling maintenance and fuel handling jobs); and a low-exposure group (office workers).

The research, which attempts to measure exposure to hydrocarbons, benzene, naphthalene and other components of JP-8, also involves urine and breath analysis. Smith will spend the next few months analyzing data on those biomarkers.

Preliminary findings show personal air-exposure levels increased across the low- to high-exposure groups, with interior fuel-tank exposure levels much higher than levels in the hangar. Personnel who are most exposed to JP-8 vapors wear respirators and other protective gear to limit their personal exposure. One goal of the research is to identify key risk and protective factors for exposure to JP-8.

Smith and Proctor said the next step in the research is to analyze neurological health outcomes for personnel exposed to the fuel over consecutive workdays while performing their job tasks.

McClean said the research is important because little is known about the extent to which JP-8 exposure may affect neurological health.

"We are particularly interested to see whether biomarkers of exposure, which provide useful measures of total absorbed dose, are associated with performance on neuropsychological tests among these workers," McClean said.

Proctor, a research epidemiologist at USARIEM, said Smith has been "a great contributor to this project and is very integral to all aspects of the project efforts."

Proctor and the research team have traveled to several Air Force bases to collect data for the study, which was initiated about two years ago.

"Currently, we are in the midst of the data-analysis phase and anticipate having results to share regarding relationships between exposure and health effects later next year," Proctor said.

Submitted by Lisa Chedekel