ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCES
UNIVERSITY of WASHINGTON · SCHOOL OF PUBLIC HEALTH

Christopher Simpson, PhD

I develop analytical chemistry techniques to better understand human exposure to hazardous chemicals in occupational and environmental settings. My lab identifies and characterizes new biomarkers that can help determine toxic exposure.

RESEARCH

- One of the main biomarkers studied in my lab is 1-nitropyrene (1-NP), an indicator of diesel exhaust exposure. We look at 1-NP levels in the urine of underground miners. These miners work with diesel equipment in confined areas and are exposed to high concentrations of diesel exhaust.
- We are developing a biomarker for manganese exposure using non-invasive hair samples. We examine biomarker levels in workers, such as welders, who can have high exposure to manganese through welding fumes. Manganese can lead to Parkinson's-like disorders of the nervous system.
- My lab is also working on a new biomarker for exposure to the widely used organophosphate pesticides. These chemicals can cause neurological problems in farm workers and their families. They are especially toxic to fetuses and young children.

TEACHING

- Environmental and Occupational Sampling and Analysis I (ENVH 431) – Students learn to analyze chemical and physical agents found in occupational and ambient environments. They conduct field and lab sampling.
- Environmental Exposure Monitoring Methods (ENVH 553) – Students learn about current monitoring methods for occupational, residential, and community exposures to hazardous chemical agents.

SERVICE

- Member of the Safety and Occupational Health Study Section for the National Institute for Occupational Safety and Health.
- Advisory board member of the Washington State Environmental Biomonitoring Study.
- Industrial Hygiene Program Director, Northwest Center for Occupational Health and Safety. http://tinyurl.com/gtb29nr

Find out more: http://deohs.washington.edu/faculty/simpson_christopher

STUDENTS WHO HAVE WORKED WITH ME

- Emily Carpenter (MS, 2015) studied the application of 1-nitropyrene (1-NP) as a biomarker of diesel exhaust exposure in underground mine workers. The use of diesel-powered equipment inside mines creates a high concentration of diesel exhaust. She showed that high levels of diesel exhaust were associated with high levels of 1-NP in the air.
- Joemy Ramsay (MS, 2015) measured urinary 1-NP metabolites in underground mine workers. She found that high levels of 1-NP in the air were associated with high levels of urinary 1-NP metabolites. Together with Emily's study, this research has helped show that 1-NP is a valid biomarker of diesel exhaust exposure.
- Erin Riley (Postdoctoral Research Scientist) used mobile monitoring techniques to map air pollution plumes from roadways. She investigated how the composition of pollution changes based on distance from the road. She has also mapped air pollution plumes emanating from the Los Angeles International Airport. Findings showed that airplane exhaust significantly contributed to the city's overall pollution.

RECENT PUBLICATIONS

Galaviz VE, Quintana PJ Yost MG, Sheppard L, Paulsen MH, Camp JE, Simpson CD. Urinary metabolites of 1-nitropyrene in US-Mexico border residents who frequently cross the San Ysidro Port of Entry. J Expo Sci Environ Epidemiol. 2015 Dec 16.

Riley EA, Banks L, Fintzi J, Gould TR, Hartin K, Schaal L, Davey M, Sheppard L, Larson T, Yost MG, Simpson CD. Multi-pollutant mobile platform measurements of air pollutants adjacent to a major roadway. Atmos Environ. 2014 Sep 6.

Li Z, Trinidad D, Pittman EN, Riley EA, Sjodin A, Dills RL, Paulsen M, Simpson CD. Urinary polycyclic aromatic hydrocarbon metabolites as biomarkers to woodsmoke exposure – results from a controlled exposure study. J Exp Sci Environ Epidemiol. 2015 Jan 21.

STUDENT PLACEMENTS

Students from my lab have gone on to teach at universities; to work in state agencies such as the California Environmental Protection Agency; to work as consultants; and to pursue further graduate study.

LEARN MORE

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Photos, from left: Measuring diesel exposure in a mine (credit: Courtesy of Emily Zamzow); Pollution source apportionment (credit: Elizabeth Sharpe); Lab work (credit: Sarah Fish); Exposure monitoring at a shipyard (credit: Chris Simpson)

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