

## Extramural papers of the month

By Nancy Lamontagne

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Read the current  
Superfund Research Program  
Research Brief. New issues  
are published on the first  
Wednesday of each month.

### Causes of hospitalization during heat waves

Researchers partially funded by NIEHS report that, among older adults, heat waves were associated with increased risk of hospitalization for fluid and electrolyte disorders, renal failure, urinary tract infection, sepsis, and heat stroke. Extreme heat is the most common cause of deaths tied to severe weather in the United States.

Most studies of heat-related health effects have looked at only a few predetermined health outcomes. For this study, the researchers considered all possible heat-related causes of hospitalizations from 1999 to 2010, by analyzing data in 214 disease groups from 23.7 Medicare enrollees per year (85 percent of Medicare enrollees), residing in 1,943 counties in the U.S.

The researchers found that older Americans were 2 1/2 times more likely to be hospitalized from heat stroke during heat wave periods than on non-heat wave days. Extreme heat also put the elderly at 18 percent greater risk of being hospitalized for fluid and electrolyte disorders; 14 percent greater risk for renal failure; 10 percent greater risk for urinary tract infections; and 6 percent greater risk for sepsis. The researchers said that sepsis had not been previously considered a possible outcome of extreme heat.

Longer and more extreme heat waves brought larger risks. Since risks remained elevated one to five days after a heat wave, prevention and treatment is critical not just during a heat wave, but also afterwards.

*Citation:* [Bobb JF, Obermeyer Z, Wang Y, Dominici F.](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/25536257>)

2014. Cause-specific risk of hospital admission related to extreme heat in older adults. *JAMA* 312(24):2659-2667.

### Phthalate exposure linked to lower IQ

NIEHS-funded researchers found that children, aged 7, who experienced prenatal exposure to elevated levels of two phthalates had lower IQ scores than children exposed to lower levels. The new research adds to the group's earlier findings of associations between prenatal exposure to phthalates and problems with cognitive function and behavior at age 3.

The study included 328 New York City women and their children from the Columbia Center for Children's Environmental Health longitudinal birth cohort. During the third trimester of pregnancy, the researchers measured urinary metabolites of four phthalates — di-n-butyl phthalate (DnBP), di-isobutyl phthalate (DiBP), di-2-ethylhexyl phthalate, and diethyl phthalate.

At age 7, the children of the mothers with the highest concentrations of DnBP and DiBP metabolites had IQs 6.6 and 7.6 points lower, respectively, than children of mothers exposed to the lowest concentrations. They found no associations between the other two phthalates and child IQ. Other research has shown that a six- or seven-point decline in IQ can substantially affect academic achievement and occupational potential.

Although some phthalates are banned from use in children's products in the U.S., pregnant women are exposed to phthalates in consumer and personal care products.

*Citation:* [Factor-Litvak P, Insel B, Calafat AM, Liu X, Perera F, Rauh VA, Whyatt RM.](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/25493564>)

2014. Persistent associations between maternal prenatal exposure to phthalates on child IQ at age 7 years. *PLoS One* 9(12):e114003.

### Cadmium exposure linked to shorter telomeres

A study supported in part by NIEHS found an association between cadmium exposure and shorter leukocyte telomere length, a

marker of cellular aging. Findings from the study also indicate that cadmium might be harmful at levels well below current safety standards set by environmental and occupational safety agencies.

Cell and animal studies have suggested that lead and cadmium induce a shortening of telomeres, which protect the ends of chromosomes. To study this type of cellular damage in people, the researchers examined leukocyte telomere length, as well as blood and urine samples, from more than 6,700 adults who participated in the National Health and Nutrition Examination Survey (NHANES) from 1999 to 2002. After adjusting for potential confounders, the highest (versus lowest) quartiles of blood and urine cadmium were associated with -5.54 percent (95 percent CI: -8.70, -2.37) and -4.50 percent (95 percent CI: -8.79, -0.20) shorter leukocyte telomere lengths, respectively, with evidence of dose-response relationship (P for trend < 0.05). The difference between participants of the same chronological age with low and high cadmium exposure is equivalent to 11 years of calendar age. No association was found between lead levels and telomere length.

Since other studies have shown an association between shorter leukocyte telomere lengths and diseases of aging, including cardiovascular disease, type 2 diabetes, dementia, and cancer, the new findings provide insight into the biological mechanisms underlying cadmium exposure and chronic disease risks.

*Citation:* [Zota AR, Needham BL, Blackburn EH, Lin J, Park SK, Rehkopf DH, Epel ES.](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/25504027>)

2015. Associations of cadmium and lead exposure with leukocyte telomere length: findings from National Health and Nutrition Examination Survey, 1999-2002. *Am J Epidemiol* 181(2):127-136.

## **U.S.-wide study links autism with prenatal exposure to fine particulate air pollution**

In one of the first U.S.-wide studies of air pollution and autism, NIEHS grantees report that women exposed to high levels of fine particulate matter during pregnancy — particularly in the third trimester — may have up to twice the risk of having a child with autism than mothers exposed to low levels of particulate matter.

The study examined the children of people living in all 50 states who were part of the Nurses' Health Study II, a cohort of more than 116,000 U.S. female nurses. From this group, the researchers identified 245 children with autism and a control group of 1,522 children without autism. They collected data on where participants lived during pregnancy and then predicted their exposure to airborne particulate matter, using previously validated spatiotemporal models based on data from the U.S. Environmental Protection Agency Air Quality System and various other sources.

The analysis showed that exposure during pregnancy to particulate matter with diameters less than or equal to 2.5 microns was significantly associated with an increased risk for autism. Exposure before or after pregnancy did not show such association. The association was stronger for exposure experienced during the third trimester, compared to the first and second trimesters. The scientists found little association between larger-sized particle air pollution and autism.

The researchers say that their findings suggest that air pollution is a modifiable risk factor for autism, and that reducing exposure during pregnancy could help lower the incidence of this neurodevelopmental disorder.

*Citation:* [Raz R, Roberts AL, Lyall K, Hart JE, Just AC, Laden F, Weiskopf MG.](#)

(<http://www.ncbi.nlm.nih.gov/pubmed/25522338>)

2014. Autism spectrum disorder and particulate matter air pollution before, during, and after pregnancy: a nested case-control analysis within the Nurses' Health Study II cohort. *Environ Health Perspect*; doi:10.1289/ehp.1408133 [Online 18 December 2014].

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