

Air pollution and impaired lung function are independent risk factors for cognitive decline

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Studies have shown that both air pollution and impaired lung function can cause cognitive deficits, but it was unclear whether air pollution diminishes cognition by reducing breathing ability first or whether air pollution represents an independent risk factor for cognitive deficit. Now a new study conducted by German and Swiss researchers has answered that question: air pollution directly affects cognition and is not mediated by lung function.

The researchers, who analyzed data from a study of 834 elderly German women, will present their findings at ATS 2015 in Denver, May 15 to 20.

"Our findings disprove the hypothesis that [air pollution](#) first decreases [lung function](#) and this decline, in turn, causes [cognitive impairment](#) by releasing stress signals and humoral mediators into the body," explains Mohammad Vossoughi, a PhD student at the Leibniz (Germany) Institute for Environmental Medicine, who led the study.

Mr. Vossoughi adds that the findings suggest other hypotheses about how air pollution affects cognition, including the possibility that [particulate matter](#) and other pollutants are translocated to the central nervous system via our sense of smell and that leads to mild cognitive impairment.

To reach their conclusions, the team of German and Swiss researchers used data from the cohort Study on the influence of Air pollution on

Lung function, Inflammation and Aging, or SALIA. The researchers first tested the association between impaired lung function and cognitive impairment. They measured change in lung function through force expiratory volume in one second (FEV1) and forced volume capacity (FVC). They measured cognitive changes using tests from the Consortium to Establish a Registry for Alzheimer's Disease (CERAD), a neuropsychological battery used to study Alzheimer's progression.

After adjusting for risk factors known to affect lung and/or cognitive impairment, including age, [body mass index](#), smoking status, education, and the presence of a gene variant implicated in Alzheimer's disease (the ApoE ε4 risk allele), they found the strongest association between impaired lung function and cognitive decline in the test that measures visuo-spatial ability. At baseline: one liter lower FVC resulted in an absolute decline in cognition of -0.3583 ($p=0.007$); one liter lower FEV1 resulted in a decline of -0.3075 ($p=0.048$). This association persisted at follow-up.

Next, the group applied a mediator analysis to test the influence of lung function on the air-pollution-cognitive-decline association. They looked at both particulate matter (PM) and nitrogen dioxide (NO₂), factors known to reduce lung health. After studying changes in FEV1 and FVC as a result of an interquartile increase in both from baseline, they could not find a corresponding decrease in visuo-spatial ability: PM10 ($\beta=-0.3158$; p

Although Mr. Vossoughi says that their study was "fairly comprehensive," he believes further studies are warranted to confirm the findings in populations including men and those who are not elderly and "to elucidate the mechanisms underlying impaired lung function, air pollution and [cognitive decline](#)."

More information: Abstract 64451: The Roles of Lung Function and

Air Pollution on Cognitive Decline: Predictor and Mediator?

Provided by American Thoracic Society

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