

2020 SOT Conference  
Abstract Number: 1135/P177  
Monday March 16, 2020  
2:15pm – 4:30pm

## **A Systematic Review and Analysis of Personal and Ambient PM<sub>2.5</sub> Measurements: Implications for Epidemiology Studies**

In epidemiology studies, ambient measurements of PM<sub>2.5</sub> (*e.g.*, from central-site outdoor air monitors) often are used as surrogates for personal exposures. However, estimating personal PM<sub>2.5</sub> from ambient measurements introduces uncertainty, and it is unclear the degree to which ambient PM<sub>2.5</sub> reflects personal exposures. We conducted a systematic review and statistical analysis of epidemiology studies to determine the extent to which ambient PM<sub>2.5</sub> is correlated with personal PM<sub>2.5</sub>. We conducted a literature search in PubMed and Scopus for peer-reviewed studies reporting both personal and ambient measurements of PM<sub>2.5</sub> in North America published between January 1, 2009, and September 4, 2019. Two independent reviewers completed data extraction, which included recording geographic variables, sample characteristics, ecological variables, ambient PM<sub>2.5</sub> measurements, personal PM<sub>2.5</sub> measurements, and ambient-personal PM<sub>2.5</sub> correlations. Twenty-three studies were identified. Overall, personal PM<sub>2.5</sub> concentrations were higher than ambient concentrations. The median personal PM<sub>2.5</sub> concentration was 17.9  $\mu\text{g}/\text{m}^3$  (range: 2.0-92.2  $\mu\text{g}/\text{m}^3$ ), and the median ambient PM<sub>2.5</sub> concentration was 15.8  $\mu\text{g}/\text{m}^3$  (range: 6.0-33.3  $\mu\text{g}/\text{m}^3$ ). There was a moderate-to-strong relationship between personal and ambient PM<sub>2.5</sub> concentrations; median personal-ambient PM<sub>2.5</sub> correlation coefficients were 0.57 (range: 0.09-0.83). Stratified analyses suggest that geographic and other variables may influence the relation between personal and ambient PM<sub>2.5</sub>. For example, studies that report controlling for environmental tobacco smoke (ETS) reported an approximate personal-ambient correlation of 0.78 on average, whereas studies that did not measure or did not report measuring ETS reported an approximate personal-ambient PM<sub>2.5</sub> correlation of 0.09 on average. Our study informs the interpretation of both past epidemiology studies in which health effects were associated with ambient PM<sub>2.5</sub> and future studies with regard to accounting for error in estimating PM<sub>2.5</sub> exposures.