Application of a Novel Sensor for Traffic-related Indoor Air Pollution

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Exposure to traffic-related air particulates (TRAP) is linked with reduced respiratory health in both public and worker populations. It has been determined that TRAP penetrates homes and occupational settings, affecting the indoor air quality. Better methods are needed for fast and accurate assessment of efficiency of control methods. A novel MicroPEM™ (Personal Exposure Monitor) device was recently developed at Research Triangle Institute (RTI) as a personal exposure monitoring device capable of direct reading measurement of PM2.5 with a simultaneous collection to a Teflon filter. No studies to date have determined if the MicroPEM, while being used for analysis of traffic-related airborne particles (TRAP) in the Cincinnati region, requires a correction factor. We hypothesize that the coefficient of variation for correction factor will be less than 20% for the Cincinnati region and that the correction factor for the PM2.5 real-time data is independent on the amount of different carbon species in the collected filter sample. One specific aim of this project is to determine a correction factor for the MicroPEM PM2.5 direct-reading data. Indoor filtered, indoor unfiltered, and outdoor air will be evaluated. The second specific aim is to evaluate the association between the correction factor and the ratio between different carbon species in Cincinnati for the assessment of traffic-related indoor pollution. A multiwavelength optical absorption technique has been developed for Teflon filters used for personal exposure sampling with sufficient sensitivity to allow apportionments of environmental tobacco smoke and soot (black) carbon to be made. The determination of tobacco smoke and carbon with reasonable accuracy is possible using an integrating sphere radiometer and multiple wavelengths to provide specificity. This work will be done in conjunction of an ongoing study funded by the U.S. Department of Housing and Urban Development Healthy Homes Technical Studies (HHTS). The MicroPEM, once an appropriate correction factor is determined, will be an easy, useful tool to determine occupational exposure to traffic-related indoor air pollution.

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