Validation of Miniaturized Particulate-Matter Samplers for PAH Exposures

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The continuous, major advances in micro-electronics and analytical chemistry hold the potential to revolutionize personal exposure assessment. New microelectronic and lab-on-a-chip approaches have allowed major gains in wearability (size, weight, noise) and functionality (real-time data in air pollution levels, location, compliance, and estimates of respiration rate). Major advances in analytical chemistry provide the means to make measurements on samples that have 40 to 100 times less mass than that collected by traditional samplers. However, validation studies are necessary to convince reviewers and funding agencies that the technologies are ready for use in proposed studies. In this project, we are seeking to validate recently developed samplers for particulate phase polycyclic aromatic hydrocarbons (PAHs) using a newly developed ionization method/mass spectrometer. The general approach will be to compare particulate phase PAH concentrations between traditional samplers (4 LPM flow rates) and co-located microAeth® samplers (50 and 100 ml/min flow rates).

Implications: This validation study provides data that would enable the integration of personal PAH assessment to the Columbia’s Center for Children’s Environmental Health cohort. This study also raises awareness of this method to the ever increasing number of groups who have bought monitors based on the microAeth® platform and other users of new personal monitors that bring back small PM samplers such as the microPEM® (RTI).

Key words: exposure assessment, PAHs, particulate matter, validation, sampling methods

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