Testing Potential Inhaled Dose as a New Exposure Metric – Step 1: Comparing Different Methods of Measuring Minute Ventilation

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Biking is a rapidly growing form of transportation in urban American/European cities, with many municipals further encouraging this growth through programs and incentives designed for cyclists. The benefits of biking are many, such as increased exercise, improved physical/mental health, and reduced traffic/air pollution; however, biking in urban areas also increases an individual's personal air pollution exposure. Bicyclists, walkers, and joggers in the New York City area exercise in close proximity to heavy levels of traffic and subsequent air pollution during increase rates of respiration. Air pollution studies in the past have used exposure metrics such as questionnaires and residential/ambient central site concentrations. To ascertain whether there are negative impacts of exercise due to air pollution or not, we want to test a new exposure metric: personal potential inhaled dose, described as PID= exposure concentration * minute ventilation / mass of individual. Minute ventilation is defined as the volume of air inhaled from an individual's lungs per minute. This summer's goals were to establish relative strengths and weaknesses of different sensors for accurately measuring minute ventilation for a upcoming cohort study of urban bikers and cardiovascular outcomes (blood pressure, heart rate variability) and to work out protocols to allow bikers to be able to self deploy the sensor package.

- How to wear the sensors
- How to calibrate the zero $PM_{2.5}$ level
- How to charge the sensors

We hypothesize that in the continuation of this study, we will see that compared to traditional exposure metrics, robust and accurate measurements of personal inhaled doses providing associations with adverse health outcomes.