Air pollution episodes like the London Fog have long been known to cause mortality, but little was known about whether lower levels typically seen in the United States impacted health, who was most susceptible, what air pollutants or air pollutant sources were driving this response, and by what mechanism(s) air pollution caused these health effects. For the past 20+ years, researchers at the University of Rochester have used both a controlled environment facility and population based methods to answer these questions and study if and how different air pollutants caused health effects including asthma exacerbation, heart attacks, and preterm birth. Drs. Mark Utell and David Rich will discuss this past work and the new directions of air pollution research here at Rochester, including efforts to model the spatial/temporal patterns of air pollutants across Monroe County, and to study associations between different air pollutant mixtures (e.g. traffic pollution, wood smoke, secondary sulfates), and myocardial infarctions and cardiorespiratory biomarkers.