TRIGGERING OF TRANSMURAL INFARCTIONS BY AMBIENT FINE PARTICLES, ROLE OF SECONDARY VERSUS PRIMARY PARTICLE SPECIES MASS FRACTIONS

David Q. Rich, *University of Rochester School of Medicine and Dentistry, Rochester, NY, USA*
Kelly Thevenet-Morrison, *University of Rochester School of Medicine and Dentistry, Rochester, NY, USA*
Howard M. Kipen, *UMDNJ - Robert Wood Johnson Medical School, Piscataway, NJ, USA*
Haluk Özkaynak, *United States Environmental Protection Agency, National Exposure Research Laboratory, Research Triangle Park, NC, USA*
Lisa Baxter, *United States Environmental Protection Agency, National Exposure Research Laboratory, Research Triangle Park, NC, USA*
Janet Burke, *United States Environmental Protection Agency, National Exposure Research Laboratory, Research Triangle Park, NC, USA*
James Crooks, *United States Environmental Protection Agency, National Exposure Research Laboratory, Research Triangle Park, NC, USA*
Melissa Lunden, *Lawrence Berkeley National Laboratories, Berkeley, CA, USA*
John Kostis, *UMDNJ - Robert Wood Johnson Medical School, Piscataway, NJ, USA*
Junfeng (Jim) Zhang, *University of Southern California, Keck School of Medicine, Los Angeles CA, USA*
Natasha Hodas, *Rutgers University, School of Environmental and Biological Sciences, New Brunswick, NJ, USA*
Barbara Turpin, *Rutgers University, School of Environmental and Biological Sciences, New Brunswick, NJ, USA*

Background: Previously, we reported an increased risk of transmural, but not non-transmural, infarctions associated with increased $PM_{2.5}$ concentrations in the previous 24 hours. We then hypothesized that this acute response to $PM_{2.5}$ differed by $PM_{2.5}$ species.

Methods: We used all ER admissions for first myocardial infarctions (2004-2006) of New Jersey residents living ≤10km from a $PM_{2.5}$ monitoring site (n=1563), measured daily $PM_{2.5}$ mass concentrations, and daily $PM_{2.5}$ species mass fractions estimated by Community Multiscale Air Quality modeling (CMAQ). Using daily bias adjusted CMAQ mass and species averages we calculated the mass fractions of sulfate, nitrate, ammonium, elemental carbon (EC), and organic carbon (OC) and ranked each daily species mass fraction into tertiles. Using a time-stratified case-crossover design and conditional logistic regression adjusted for apparent temperature, we then estimated the risk of a transmural infarction associated with each 10.8 $\mu g/m^3$ increase in measured $PM_{2.5}$ concentration in the previous 24 hours within each tertile of each species (e.g. high, middle, and low sulfate; high, middle, and low EC, etc.).

Results: We found the largest relative risk estimates on the days with the highest tertile of sulfate (OR=1.13; 95% CI = 1.00, 1.27), nitrate (OR=1.15; 95% = 0.98, 1.35), and ammonium (OR=1.13; 95% CI = 1.00, 1.28), and the lowest tertile of EC (OR=1.17; 95% CI = 1.03, 1.34). "High ammonium" and "low EC" appear to represent the same days, as they have the same mean temperature (15 ± 11°C) and $PM_{2.5}$ composition (29% sulfate, 21% OC, 15% ammonium, 14% nitrate, 7% EC, 14% other).

Conclusions: EC is a tracer for primary $PM_{2.5}$ (including primary OC) and secondary OC is often correlated with sulfate. Thus, this suggests the acute effect of ambient $PM_{2.5}$ on transmural infarctions is greatest on days with a larger fraction of secondary PM (sulfate, nitrate and/or secondary OC).