Strengthening the Connections between Air Quality and Health Effects

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Key Connections

• From AQ to Health
  Speciated ambient data – temporal and spatial variability
  Understanding of relationships between ambient and exposure
  Source characteristics – emissions, prevalence, operational patterns

• From Health to AQ
  Attributes most closely associated with adverse effects
  Components or species known to lead to damage, from tox and clinical studies
  Susceptible populations – important for exposure, hot spot studies

• Both Directions
  Collaboration increases innovation, creates new methods
Clues to Toxic Attributes

Study of exposure to primary PM from coal indicate significant size- and composition-related differences in health response.

Significantly greater response to ultrafine particles than to fine or coarse particles from same coal – both size and composition are different.
Are There Health Effects Associated with Coarse Particulate Matter?

Effect of size fractionated ambient PM on the release of IL8 by human bronchial epithelial cells

Effect of size fractionated ambient PM on TNF-α release in LPS resistant (C3H/HeJ) and susceptible (C3H/OUJ) mice
Particle characteristics (size) change significantly as distance from freeway increases.

Particle effects also change significantly as distance increases – essentially the same as control responses.

Much finer spatial resolution of effects are possible than when using central monitor data.
MultiPollutant/MultiCity Studies to Link to Sources

Associating health outcomes with different source types provides additional information about source-related toxicity.

Merging source apportionment techniques with epidemiology can yield important information about source to health outcome linkages.