Research Needs

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Research Needs

I will focus on two research needs:

- Assessment of human exposures to PM components and;
- Identification of PM toxic components
Outdoor Measures Versus Actual Human Exposures

- High correlations for fine mass and sulfates
- Weak correlations for coarse and ultrafine particles and black carbon
- Human exposures/outdoor concentration relationships depend on home ventilation rates and vary by city and season
Continue Research on PM Exposure Assessment

- Assess human exposures to fine, coarse and ultrafine particles and their components as they relate exposures to specific sources
- Focus on susceptible subpopulations
- Investigate differences among cities
Identify Toxic Components/Sources

- Conventional Epidemiological Studies -- Challenges
  - Particles are internal mixtures
  - Components are correlated
  - Co-pollutants are present
  - Sources are spatially mixed
  - More than one silver bullet may exist
Accomplishments

- A large spectrum of cardiopulmonary and respiratory outcomes have been associated with particle exposures
- A number of susceptible subpopulations have been identified
- Toxicological and exposure assessment studies have been very useful in our efforts to validate epidemiological studies
Use Available Biological, Exposure and Statistical of Tools

- Conduct studies that address specific hypothesis regarding different sources/components by creating the appropriate exposure scenarios
Population Studies

- **Multiple Cities**
  - Particle toxicity versus composition (e.g. LA vs NY)
  - Exposures and climatic differences (e.g. home ventilation, penetration of sulfate vs nitrate)

- **Single City**
  - Toxicity of specific sources (e.g. individuals living at different distances from roads)
  - Particles and gaseous co-pollutant concentrations may be correlated
Panel Studies

- Patrolmen study (highway exposures)
- Bus study (city traffic exposures)
Controlled Exposures

- Source particles (e.g. diesel, wood burning, secondary particles of a specific source)
- Concentrated ambient particles (e.g. fine vs coarse vs ultrafine)