Identifying Characteristics of Air Pollutants Associated with Heart Disease Indicators

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Air Resources Board
California Environmental Protection Agency
PM and Cardiovascular Health

Proposed Biological Mechanism

PM Exposure

- Inflammation
- Platelet Activation (Blood clots)
- Oxidative Stress (Cellular Damage)

Adverse Cardiovascular Outcomes
Objective of Study *:

Identify PM characteristics associated with changes in three classes of biomarkers of cellular injury

Methods

• 29 elderly adults in Southern California with coronary artery disease

• Blood analyzed for three classes of biomarkers

• PM characterization
  – PM mass for different size fractions
    • Quasi-ultrafine (≤0.25µm)
    • “Fine” (0.25-2.5µm)
    • Coarse (10-2.5µm)
  – Particle number
  – PM source: primary vs. secondary
  – PM origin: indoor vs. outdoor
Results

Changes in biomarker levels most consistently associated with:

- Ultrafine PM (≤0.25µm)
- Primary combustion PM (elemental and organic carbon)
- Particle number
- PM2.5 components originating outdoors
Conclusion

- Traffic-related pollutants can lead to changes in biomarker levels
  - Ultrafine PM, primary organic and elemental carbon
- Exposure to these components of PM may lead to acute adverse health outcomes in elderly people with cardiovascular disease