

Identifying Characteristics of Air Pollutants Associated with Heart Disease Indicators

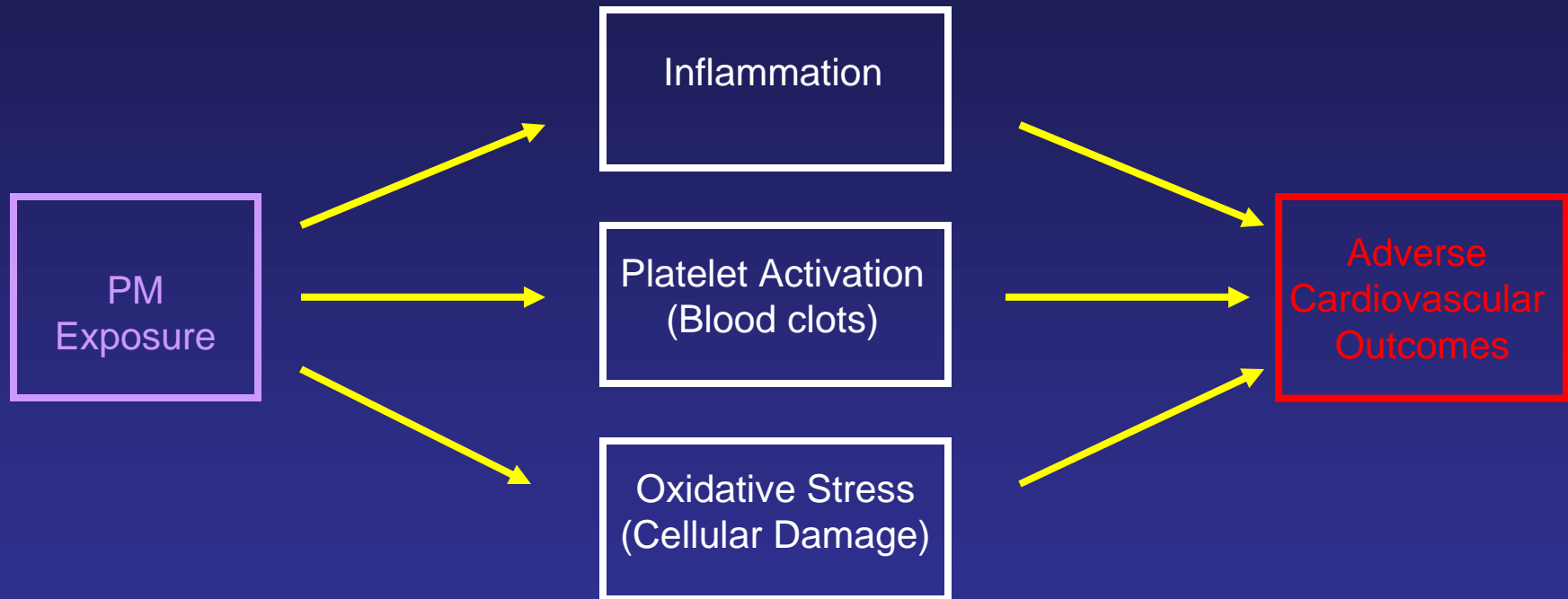


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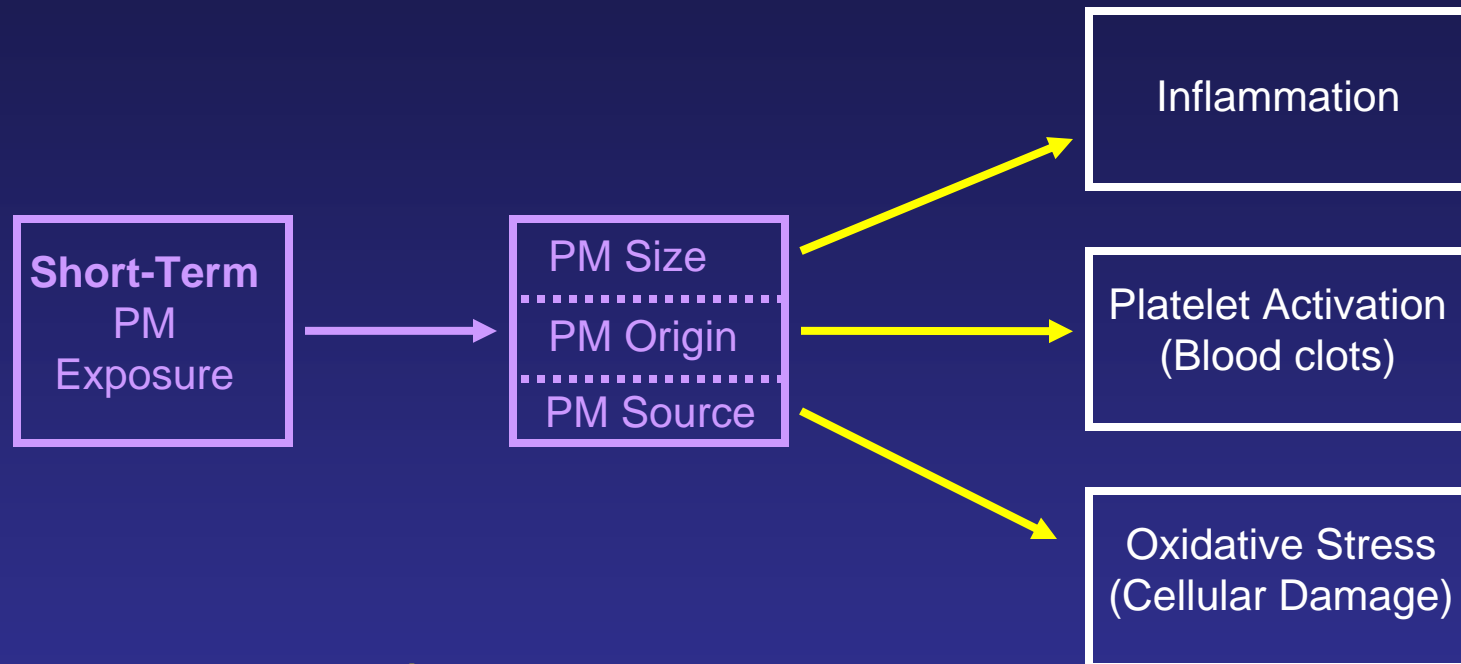
Air Resources Board
California Environmental Protection Agency

PM and Cardiovascular Health



Proposed Biological Mechanism

Objective



Objective of Study * :

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

*Delfino, R.J. Staimer, R. Tjoa, T. Polidori, A. Arhami, M. Gillen, D.L. Kleinman, M.R., Vazairi, N.D., Longhurst, Zaldivar, F. Sioutas, C. "Circulating Biomarkers of inflammation, Antioxidant Activity, and Platelet Activation Are Associated with Primary Combustion Aerosols in Subjects with Coronary Artery Disease". Environmental Health Perspectives 116:898-906 (2008) ARB Contract 03-329

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 ($\leq 0.25\mu\text{m}$)
 - “Fine” ($0.25\text{-}2.5\mu\text{m}$)
 - Coarse ($10\text{-}2.5\mu\text{m}$)
 - Particle number
 - PM source: primary vs. secondary
 - PM origin: indoor vs. outdoor



Results

Changes in biomarker levels most consistently associated with:

- Ultrafine PM ($\leq 0.25\mu\text{m}$)
- Primary combustion PM (elemental and organic carbon)
- Particle number
- PM_{2.5} 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

