

HEALTH EFFECTS OF AIRBORNE PARTICULATE MATTER

RECENT STUDY ON ACUTE EXPOSURE AND HEART DISEASE

March 21, 2002

Air Resources Board



California Environmental Protection Agency

(Slide 1)

Thank you Mr. Kinney. Good morning Dr. Lloyd and members of the Board. Today I would like to discuss results of a recent study regarding airborne particulate matter and health effects. More specifically, I would like to discuss some information on fine particulate matter (PM 2.5) and indicated cardiovascular health effects

To begin and provide a prospective,

The Board will review and determine whether Ambient Air Quality Standard for PM adequately protects the public, including children. Staff is scheduled to present recommendations to the Board June 2002.

PM HEALTH EFFECTS

Acute PM exposure associated with:

- Increases in mortality
- Increases in rates of hospitalization and ER visits for cardiovascular problems



(Slide 2)

Scientists have studied particulate matter (or PM) exposure and health effects and have reported that PM is associated with increases in mortality and increases in the rates of hospitalization and emergency room (er) visits for cardiopulmonary health effects.

These studies were conducted in a number of cities, both in the US and internationally. However, very few studies have addressed shorter-term (less than 24-hour) PM exposures and health effects.

Further, very few studies have addressed a major cardiovascular health effect, myocardial infarction (MI) or “heart attacks”, and its relationship to PM exposure. This brings us to the current study.

INCREASED PM AND MYOCARDIAL INFARCTION

- Recent results on transient risk of myocardial infarction (MI) or “heart attacks” after short-term exposures to PM
- 772 patients with MI in Boston area
- Ave. age: 62 years old



(Slide 3)

Recently, Peters and colleagues from Harvard University conducted an epidemiological study involving patients who had myocardial infarctions and PM exposures. They studied the risk of MI after short-term (hourly) or acute exposures to PM.

The Study Design consisted of interviewing 772 patients with MI in the Boston area. The average age of the patients was approximately 62 years old. Hourly concentrations of PM 2.5 were measured at a site in Boston. The time after exposure to PM were investigated in relation to the onset of MI.

RESULTS

- Risk of MI significantly increased when PM 2.5 was elevated:
 - In the 2-hour period before onset
 - Between 24 and 48 hours before onset



(Slide 4)

The results reported were important for evaluating the cardiovascular health impacts of PM. The investigators reported that the risk of MI increased with elevated PM 2.5, especially if exposure occurred in the previous 2-hr period.

The ratio of approximately 1.5 (referred to as the odds ratio or the ratio of MI over that of the control) was associated with an increase of 25 ug/m³ PM 2.5 during a 2-hour period before the MI onset.

Another important finding was that the investigators reported that there was a delayed response associated with 24-hr PM 2.5 measured. One day after exposure to elevated PM also significantly increased the risk to MI. The ratio was approximately 1.7 for an increase of 20 ug/m³.

SUMMARY

- **Short-term elevated PM 2.5 associated with a elevated risk of MI**
- **Biological mechanisms by which PM triggers MI under investigation**
- **Current research focuses on biological effects of PM that may be related to cardiac effects**



(Slide 5)

In summary, recent research indicate that elevated concentrations of PM 2.5 are associated with transient elevated risk of MI – a major cardiovascular health effect.

The biological mechanism or mechanisms by which PM triggers MI are currently unknown. The authors indicate that the two distinct exposure times before MI onset may indicate different mechanisms of toxicity of PM 2.5. These mechanisms of cardiovascular effects and PM are an important focus of current research involving laboratory studies.

This concludes our presentation. We look forward to discussing other health-related research information with you in the future.

Thank you very much.