

## Estimating health effects of atmospheric aerosol particles

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There is evidence supporting that atmospheric aerosol particles inhaled into the respiratory tract have adverse health effects on respiratory and cardiovascular systems. Toxicological studies have shown the following biological mechanisms. Aerosol particles deposited on airway and alveolar surface could 1) induce inflammation in the lung and its airways which results in lung damage, 2) induce respiratory hypersensitivity and aggravate asthma and allergic rhinitis, 3) increase susceptibility to respiratory infection. It is also suggested the pathways for cardiovascular diseases. Particles could 1) trigger arrhythmias and cause adverse cardiac function by changing autonomic nervous system regulation, 2) increase superoxide and accelerate remodeling of blood vessels, 3) activate platelet/coagulation which trigger the atherothrombotic events of coronary arteries.

Most of the studies examining the association between ambient aerosol particles and human health using epidemiological methods are from North America and Europe. In those studies, the magnitude of the health effects of ambient aerosol particles is estimated by comparing the daily number of health events (such as death, hospitalization, and emergency room visits) and daily concentration of particles. In Japan, we combined the mortality data and concentration of PM<sub>2.5</sub> (particles with diameter less than 2.5 micrometer) measured at the monitoring stations for 20 cities during 2002-2004, and observed that PM<sub>2.5</sub> concentration was positively associated with the number of deaths due to respiratory diseases. Although the results did not show significant association between PM<sub>2.5</sub> concentration and mortality due to cardiovascular diseases (heart diseases and stroke), we found that PM<sub>2.5</sub> was associated with mortality specific cardiac disease (acute myocardial infarction).

Previous epidemiological studies have also suggested the health effect varies by area and season. It is possible that the difference in particles composition is attributed to the effect size.

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