

Cardiovascular Diseases Induced by Air Pollution

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Abstract

Air pollution is a major global issue associated with human health and represents severe threats for public health. The sources of air pollution include particulate matter, PM_{2.5} defined by size range < 2.5 μm, and nanoparticles, NPs with size < 100 nm. This review focuses on cardiovascular diseases induced by air pollution as demonstrated by epidemiological and toxicological studies. A strong association is demonstrated between increases in airborne PM_{2.5} and NPs concentrations and premature mortality, cardiopulmonary diseases, asthma, and lung cancer. The mechanisms (direct and indirect) of toxicological effects induced by PM_{2.5} and NPs are related to their size, chemical compositions, lung clearance and retention, cellular oxidative stress responses and pro-inflammatory effects locally and systemically. Furthermore, the development of nanotechnology brings increasing production of nanomaterials and engineered nanoparticles and raises concerns on human exposure and health effects.

Keywords: Air pollution, particulate matters, nanoparticles, systemic effects, cardiovascular diseases

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Introduction

The World Health Organization, estimate that 4.2 million deaths were caused by ambient air pollution in 2016. Worldwide, 16% generated by lung cancer, 17% because of ischemic heart disease and stroke, and around 26% of the deaths were due to respiratory infection caused by ambient air pollution [1]. Because of the aging population and despite to all notable advances in treatment and management, cardiovascular disease (CVD) remains the most important cause of mortality for all population and prevalence is on the rise (First American Heart Association: 1+AHA). During human evolution they have created complex personal