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Traffic Related Pollution: Risk Factor for the Development of Cardiovascular Diseases?

Traffic-related air pollution is a major source of human exposure to particulate matter (PM) of a broad size range including particles in the coarse, fines, ultrafine and smaller ranges. While acute cardio-respiratory effects of exposure to PM have been established both experimentally and epidemiologically, the contribution of PM to the development of chronic pathologies is less clear. Large epidemiological studies suggest a role of long-term exposure to ambient PM in premature cardiovascular mortality. However, it is not clear whether these observations are the result of PM contributing to the triggering of cardiovascular events among susceptible subjects, i.e. namely those with pre-existing atherosclerosis or whether ambient pollutants contribute to the mechanisms

relevant to the development of cardiovascular diseases. Current paradigms of chronic systemic pathways of cardiovascular PM toxicity will be reviewed. Evidence from chronic effect animal models suggest a causal atherogenic role of ambient PM, observed in experimental models among rabbits, rats, and mice. These findings will be compared with published as well as ongoing studies conducted in humans to investigate the contribution of PM to the development of atherosclerosis. These novel studies use pre-clinical markers of this chronic pathology to disentangle the known role of pollution in triggering cardiovascular effects from the potential atherogenic role of ambient pollution. The distinction is of major scientific and public health relevance. If air pollution is only a trigger of cardiovascular events among those with pre-existing atherosclerosis, prevention of atherosclerosis (e.g. non-smoking; physical activity; healthy diet) will also reduce the acute impact of air pollution. Else, if pollutants contribute to the development of atherosclerosis, reduction in air pollution would be considered primary prevention of cardiovascular pathologies, which are the leading causes of death in Western societies.