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Ischemic and Thrombotic Effects of Dilute Diesel-Exhaust Inhalation in Men with Coronary Heart Disease

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ABSTRACT

Background Exposure to air pollution from traffic is associated with adverse cardiovascular events. The mechanisms for this association are unknown. We conducted a controlled exposure to dilute diesel exhaust in patients with stable coronary heart disease to determine the direct effect of air pollution on myocardial, vascular, and fibrinolytic function.

Methods In a double-blind, randomized, crossover study, 20 men with prior myocardial infarction were exposed, in two separate sessions, to dilute diesel exhaust (300 µg per cubic meter) or filtered air for 1 hour during periods of rest and moderate exercise in a controlled-exposure facility. During the exposure, myocardial ischemia was quantified by ST-segment analysis using continuous 12-lead electrocardiography. Six hours after exposure, vasomotor and fibrinolytic function were assessed by means of intraarterial

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agonist infusions.

Results During both exposure sessions, the heart rate increased with exercise ($P<0.001$); the increase was similar during exposure to diesel exhaust and exposure to filtered air ($P=0.67$). Exercise-induced ST-segment depression was present in all patients, but there was a greater increase in the ischemic burden during exposure to diesel exhaust (-22 ± 4 vs. -8 ± 6 millivolt seconds, $P<0.001$). Exposure to diesel exhaust did not aggravate preexisting vasomotor dysfunction, but it did reduce the acute release of endothelial tissue plasminogen activator ($P=0.009$; 35% decrease in the area under the curve).

Conclusions Brief exposure to dilute diesel exhaust promotes myocardial ischemia and inhibits endogenous fibrinolytic capacity in men with stable coronary heart disease. Our findings point to ischemic and thrombotic mechanisms that may explain in part the observation that exposure to combustion-derived air pollution is associated with adverse cardiovascular events. (ClinicalTrials.gov number, NCT00437138 [ClinicalTrials.gov] .)

Source Information

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- Mittleman, M. A. (2007). Air Pollution, Exercise, and Cardiovascular Risk. *NEJM* 357: 1147-1149 [[Full Text](#)]
- (2007). Diesel Exhaust and Cardiovascular Events. *Journal Watch Cardiology* 2007: 1-1 [[Full Text](#)]

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