Brief Rapid Communications

Inhalation of Fine Particulate Air Pollution and Ozone Causes Acute Arterial Vasoconstriction in Healthy Adults

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Background—Fine particulate air pollution and ozone are associated with increased cardiovascular events. To help explain the mechanism behind these observations, we investigated the effect of air pollution exposure on vascular function.

Methods and Results—Twenty-five healthy adults underwent a randomized, double-blind, crossover study comparing the vascular response to the 2-hour inhalation of ≈150 μg/m³ of concentrated ambient fine particles (CAP) plus ozone (120 ppb) versus the response to the inhalation of filtered air. High-resolution vascular ultrasonography was used to measure alterations in brachial artery diameter, endothelial-dependent flow-mediated dilatation (FMD) and endothelial-independent nitroglycerin-mediated dilatation (NMD). Exposure to CAP plus ozone caused a significant brachial artery vasoconstriction compared with filtered air inhalation (-0.09±0.15 mm versus +0.01±0.18 mm, P=0.03). There were no significant differences in FMD (+0.29±4.11% versus -0.03±6.63%, P=0.88),
NMD (+3.87±5.43% versus +3.46±7.92%, \( P=0.83 \)), or blood pressure responses between exposures.

**Conclusions**— Short-term inhalation of fine particulate air pollution and ozone at concentrations that occur in the urban environment causes acute conduit artery vasoconstriction.

**Key Words:** vasculature • endothelin • endothelium • air pollution

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