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TIME DEPENDENCE FOR VASCULAR EFFECTS OF WATER-SOLUBLE COMPONENTS OF DIESEL EXHAUST IN ATHEROSCLEROSIS RATS

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Objective Ambient particulate air pollution can aggravate cardiovascular disease by mechanisms suggested to involve translocation of particles to the bloodstream and impairment of endothelial function. Whether the direct impairment is time-dependent remains unknown. This study was designed to examine the effects of water-soluble components (WSC) of diesel exhaust particles (DEP) on the vasomotor functions in aorta from atherosclerosis rats without dependence upon lung-mediated response.

Methods Atherosclerosis rats and normal rats (n=10) were killed 1 h or 6 h after intravenous injection of WSC of DEP 10 mg/kg bodyweight and aorta ring segments were mounted on wire myographs to measure vasomotor functions.

Results At the concentration from 100 nM to 10 μ M, endothelium-dependent acetylcholine (ACh)-induced vasodilation precontracted with noradrenalin (NE) was weakened in the 1 h group compared with the control group and the 6 h group in atherosclerosis rats and normal rats ($p<0.05$). Similar response occurred in endothelium-independent sodium nitroprusside (SNP)-induced vasorelaxation precontracted with NE in normal rats, however, no significant changes in atherosclerosis rats. Contraction rates induced by l-phenylephrine hydrochloride (PE) were higher in the 1 h group than in the control group and the 6 h group in atherosclerosis rats but no changes in normal rats ($p<0.05$).

Conclusions These findings indicate that WSC of DEP may do a direct injury to the vascular wall, the effects on vascular functions are time-dependent at the early stage in atherosclerosis rats.