Health Effects in Healthy Volunteers in Controlled Experimental Exposure to Diesel Exhaust and Traffic Noise

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Introduction: Exposure to diesel exhaust (DE) and traffic noise is common. Previous studies found an inflammatory response in healthy volunteers, but no effect on lung function after one hour diesel exposure (particle mass concentration 350 $\mu g/m^3$ and NO_2 concentration of 0.62 ppm).

Methods: Eighteen healthy volunteers were exposed in a stainless steel chamber four times, each 3 hours: 1) zero exposure, 2) high DE (300 $\mu g/m^3$ and NO_2 1.4 ppm) and low traffic noise, 3) low DE and high traffic noise 75 dB(A) and 4) high DE and high traffic noise.

Immediately before and after exposure we performed medical examination, spirometry, rhinometry and blood sampling (repeated next morning). Symptom scores and peak expiratory flow (PEF) and ECG measurements were assessed before, 15 min, 75 min and 135 min into exposure and after. Generalized Estimating Equation (GEE) model was used to analyze collected data.

Results: Self-rated irritation of the eyes and throat was higher during DE than non-diesel exposure (non-DE), with a statistically significant difference after 75 (eyes) and 135 min (eyes, throat). Signs of irritation in the upper airways were significantly more common after DE (OR=3.2) and tended to be so also for the eyes (OR=3.1, p=0.06). PEF increased during non-diesel exposure, but decreased during DE, with a statistically significant difference after 75 (+4.08 *vs* -9.58 l/s), and 135 min (+8.11 l/s *vs* -3.5 l/s). Leukocyte concentrations were higher after exposure to DE than non-DE, and a tendency (p=0.07) toward increased interleukin-6 concentrations was observed.

Discussion: We found adverse acute effects with regard to symptoms, signs, PEF, and inflammatory markers in healthy volunteers exposed 3 hours to diesel (300 $\mu g/m^3$ and NO_2 1.4 ppm). TLV(8hours) of NO_2 is 1 ppm. These effects were first seen after 75 min of exposure. Preliminary results show correlations between heart rate variability and sound pressure.

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