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Title: Respiratory effects in a chamber study of diesel exhaust exposure in healthy volunteers

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Body: Background In previous chamber studies of diesel exhaust exposure by the Umea group, volunteers were exposed to particle mass concentrations (PM) of 300 µg/m^3 for 1 hour. Clear effects were found in bronchial biopsies and BAL, but not in crude lung function tests. Aim To examine whether exposure to diesel exhaust at 300 µg/m^3 for 3 hours would cause symptoms, signs and or lung function changes. Methods Eighteen healthy subjects were exposed twice to diesel exhaust at 300 µg/m^3, and twice to clean air (<3µg/m^3), in a double-blind cross-over design, at least one week apart. NO_2 levels were about 1.4 ppm. Before and after exposure medical examination and spirometry were performed. Symptom scores and PEF were assessed before, and after 15, 75, and 135 minutes of exposure. Generalized Estimating Equation models were used to analyze changes from baseline, adjusted for exposure sequence. Results Symptom scores for eyes and throat were higher during diesel exhaust exposure than during filtered air after 75 and 135 minutes. Signs of irritation in upper airways were more common after diesel exhaust exposure. PEF increased during filtered air exposure, but decreased during diesel exhaust, with a statistically significant difference after 75 and 135 minutes. There were no such differences for spirometry. Discussion and Conclusion Increased symptoms and signs from eyes and upper airways were to be expected, while a decrease of PEF has not been reported previously. Repeated PEF measurements during exposure may be a statistically more powerful design than spirometry before and after exposure. Symptoms, signs, and lung function changes were found at exposure levels much lower than occupational limit values.