Abstract:

The potential effects of combinations of dilute whole diesel **exhaust** (DE) and ozone (03), each a common component of ambient airborne pollutant mixtures, on lung function were examined. Healthy young human volunteers were exposed for 2 hr. to pollutants while exercising (~50 L/min) intermittently on two consecutive days. Day 1 exposures were either to filtered air, DE (300 µg/m (3)), 03 (0.300 ppm), or the combination of both pollutants. On Day 2 all exposures were to 03 (0.300 ppm), and Day 3 served as a followup observation day. Lung function was assessed by spirometry just prior to, immediately after, and up to 4 hr. post-exposure on each exposure day. Functional pulmonary responses to the pollutants were also characterized based on stratification by glutathione S-transferase mu 1 (GSTM1) genotype. On Day 1, exposure to air or DE did not change FEV1 or FVC in the subject population (n = 15). The co-exposure to 03 and DE decreased FEV1 (17.6%) to a greater extent than 03 alone (9.9%). To test for synergistic exposure effects, i.e., in a greater than additive fashion, FEV1 changes post individual 03 and DE exposures were summed together and compared to the combined DE and 03 exposure; the p value was 0.057. On Day 2, subjects who received DE exposure on Day 1 had a larger FEV1 decrement (14.7%) immediately after the 03 exposure than the individuals' matched response following a Day 1 air exposure (10.9%). GSTM1 genotype did not affect the magnitude of lung function changes in a significant fashion. These data suggest that altered respiratory responses to the combination of 03 and DE exposure can be observed showing a greater than additive manner. In addition, 03-induced lung function decrements are greater with a prior exposure to DE compared to a prior exposure to filtered air. Based on the joint occurrence of these pollutants in the ambient environment, the potential exists for interactions in more than an additive fashion affecting lung physiological processes.