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THE EFFECTIVE DOSE CONCEPT EXTENDED TO BREATHING PATTERN KINETICS IN EXERCISING DOGS EXPOSED TO OZONE CONTAINING ATMOSPHERE. P. Reischl, W.J. Mautz*, and R.F. Phalen*. Air Pollution Health Effects Laboratory, Dept. of Community & Environmental Medicine, University of California, Irvine, CA 92717

Adams et al. (J.A.P. 51:415-422, 1981) emphasized use of effective dose (ED), the product of (O_3), duration, and ventilation ($\dot{V}_E$). We extend this concept to breathing pattern analysis during exercise to include peak insp. flow (F_{IP}), insp. time (T_I), and total br. time (T_{TOT}). Five beagle dogs, trained to exercise at 5 km/hr at grade alternated between 0% and 15% on a cooled treadmill to maintain body temperature without panting, breathed through a mask. Exposure atmospheres were 1)air, 2)mix of 5 ppm SO_2 and 1 mg/m^3 $(NH_4)_2SO_4$ aerosol or 3)mix of 5 ppm SO_2, 1 mg/m^3 $(NH_4)_2SO_4$, and 0.6 ppm O_3. Inhal. of #2 did not affect $\dot{V}_E$, F_{IP}, T_{TOT}, OR T_I/T_{TOT} over the 2.25 hr exposure. Means $\pm$SD were respectively 11$\pm$1 L/min(BTPS), 27$\pm$4 L/min(BTPS), 1.9$\pm$0.3 sec, and 0.59$\pm$0.07. Inhal. of #3 resulted in curvilinear change over time in F_{IP}, T_{TOT}, and T_I/T_{TOT}. In paired t test comparisons ($p<0.05$,df=4) of beginning to end of 2.25 hr exposure, F_{IP} increased by 6 L/min (BTPS), T_{TOT} decreased by 0.8 sec, and T_I/T_{TOT} decreased by 0.03. T_{TOT} followed a second order function of ED of O_3: $T_{TOT}=2$ sec$-K\cdot(ED)^2$, $K=1\times10^{-6}$ sec/(ppm$\cdot$L)^2 ($p<0.05$,df=3). $\dot{V}_E$ was up by 2 L/min at end of exposure. We conclude complex atmosphere with ozone produces a 2nd order, not a linear dependence on ED of O_3 during exercise. (Supported in part by EPRI #RP1962-1, and Southern California Edison #J1158901.)