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TITLE: PULMONARY EFFECTS OF ULTRAFINE COAL FLY ASH INHALED BY GUINEA PIGS.

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ABSTRACT: Guinea pigs were exposed to ultrafine coal fly ash produced in a laboratory furnace. The average mass median aerodynamic diameter and the average mass concentration of Illinois no. 6 fly ash produced in all exposure conditions were 0.21 microns and 5.8 mg/m³, respectively. In guinea pigs exposed to Illinois no. 6 fly ash, total lung capacity (TLC), vital capacity (VC), and diffusing capacity for carbon monoxide (DLco) were significantly reduced below the control values immediately, 2 h, and 8 h postexposure. The diffusing capacity was still 10% below the control 96 h after exposure. The total sulfate in the Illinois no. 6 fly ash as determined using ion chromatography is 1105 +/- 120 micrograms/m³. Animals exposed to the Montana lignite fly ash at comparable concentration and particle size did not show alteration in diffusing capacity. The data suggest that part of the sulfate present in the fly ash of Illinois no. 6 could be in the form of sulfuric acid and is responsible for the adverse effects observed in the exposed animals. The sulfuric acid in the fly ash of Montana lignite is neutralized by its high alkali content and produces no change in lung functions.