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ASBESTOS DUST DEPOSITION AND RETENTION IN RATS

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INTRODUCTION

In previous animal dusting experiments histological studies have established differences in the fibrogenic properties of various types of asbestos (Wagner, 1963 and elsewhere in this monograph). Experiences with human cases of pleural mesothelioma have indicated that these have occurred mainly in association with the inhalation of crocidolite, but in a current research project the intrapleural inoculation of a variety of dusts—chrysotile, crocidolite, amosite, and silica—into rats has induced pleural mesotheliomas. The amount of dust inoculated, 20 mg., appeared by histological examination to be greatly in excess of the amount found in the majority of human cases of pleural mesothelioma.

In an attempt to clarify the position a series of dusting experiments was planned, and for this it was desirable to produce an experimental method by which equal amounts of any asbestos dust could be deposited in the lungs of rats by an inhalation method. Additionally it was necessary to ascertain whether the various types of asbestos were retained in the lungs to the same extent and had a similar histological distribution. With these objectives a method was devised for producing the dust clouds and a preliminary experiment carried out.

METHODS

Materials

Fifty-seven male and 58 female standard Wistar Albino rats were available for the experiment, and these were randomly allocated on a statistical basis into 5 groups. Four of the groups each containing 12 male and 12 female rats were exposed to airborne clouds of chrysotile, crocidolite, amosite, or powdered glass; the first group was not exposed to dust, and the rats making up this group were used as controls. The powdered glass was included as an inert nonfibrous dust for comparative purposes.

Rhodesian chrysotile and South African crocidolite and amosite were obtained in the most finely ground commercial grade, and each was further ground in a microhammer mill to break down any compressed lumps.

Dust Cloud Production

The airborne dust clouds were generated by redispersing the ground asbestos, and the method is indicated schematically in FIGURE 1. The as-