

COMPARISON BETWEEN *IN VITRO* TOXICITY OF POLYMER AND MINERAL DUSTS AND THEIR FIBROGENICITY

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Abstract—The cytotoxicity of a variety of polymer dusts to suspensions of rat alveolar and peritoneal macrophages in culture was measured using trypan blue as an indicator of cell death. Suspensions of the same dusts were administered to rats by intraperitoneal injection and the tissue reaction examined at 1 month and 3 months. A good correlation was found between the cytotoxicity of the dusts to macrophages in culture and the degree of fibrosis caused by them in the animals.

INTRODUCTION

THE RELATIONSHIP between cytotoxicity of mineral dusts to macrophages *in vitro* and their fibrogenic activity *in vivo* was examined by MARKS *et al.* (1956) using a quantitative *in vitro* technique (MARKS and MASON, 1956). Further work was carried out by CONNING *et al.* (1971) who compared the ability of several mineral and polymer dusts to produce progressive or persistent fibrosis after intraperitoneal or intratracheal injection in rats, and their cytotoxic activity in rat alveolar and peritoneal macrophages in culture. They were able to distinguish three distinct levels of cytotoxicity *in vitro* which related directly to the degree of fibrogenicity of the dusts *in vivo*. The dusts of low cytotoxicity did not cause persistent fibrosis; those of intermediate cytotoxicity were comparable to silica in their ability to cause progressive fibrosis. Only asbestos was placed in the third category of cytotoxicity and this produced the most fibrosis.

The results of these investigations suggest that there is a direct relationship between cytotoxicity of a dust to macrophages in culture and fibrogenicity in the living animal. With the limited material available they were unable to elucidate the effects of changes in particle size and configuration. MARKS *et al.* (1956) examined only mineral dusts, and CONNING *et al.* (1971) examined two mineral and two polymer dusts. The present study examines the relation between cytotoxicity to macrophages in culture and the fibrogenic activity *in vivo* of a much wider range of polymer and mineral dusts allowing more general conclusions to be drawn.

MATERIALS AND METHODS

Animals

Specific pathogen free albino Wistar rats (Alderley Park strain) of both sexes and of a weight range 200-250 g were used.