

The reaction of the hamster lung to chrysotile dust is the antithesis of that observed in rats. The lesion extends from the proximal portion of the racemus to the peripheral alveoli, thereby producing extensive consolidations in the hamster lungs. The consolidations are composed of obliterated air spaces, the lumens of which are filled with masses of alveolar cells, mostly desquamated (Fig 6). Although the inflammation involves the entire racemus in this animal, the proximal portion shows more severe involvement than the peripheral portion. It is this extensiveness of asbestotic involvement with consequent pulmonary inadequacy that accounts for the high mortality of the hamsters.

With the previously given definition of progression in mind, it is seen that the diffuse involvement of the racemus in the hamster would fit the first requirement for progressiveness of the disease, if it can be shown that the inflammation originally was confined to the proximal portion of the racemus and then extended into the peripheral air spaces. This information, unfortunately, is not available from the present investigation. However, the finding of a more severe involvement of the proximal portion of the racemus favors the probability that such an extension took place. The second requirement of progression, i.e., that the inflammation remain active and nonhealing, is a conspicuous feature of the asbestotic hamster lungs. The failure of the argyrophilic fibers to lose their arborescence and to collagenize and the persistence of the extreme cellularity of the involved tissues nearly two years after the intrapulmonary dust deposition is incontrovertible evidence of nonhealing.

Two possible explanations come to mind for the difference in the disease produced in the rat and the hamster by the same chrysotile dust. One explanation is that the reactivity of hamster tissue to the dust is greater than that of rat tissue. The other is that the hamster's alveolar clearance mechanism is not as capable as that of rats in transporting the dust from the peripheral air spaces proximally. As will be seen below, both explanations apply.

There is some evidence that the hamster's pulmonary clearance mechanism is not as effective as that of the rat. This is seen in

the considerably larger amount of acid-insoluble mineral ash demonstrable in the hamster lung sections than in those of rats. Further evidence is seen in the diffuseness of the dust distribution in the hamster (Fig 9) in contrast to its restriction to the proximal portion of the racemus as in the rat (Fig 5).

The reactivity of hamster tissue to chrysotile fibers is significantly different from that of rat tissue, the former being much more florid. This is seen not only in the plentiful production of asbestos bodies in hamster lungs but also in the failure of argyrophilic precollagenous fibers to mature into collagen as well as in the undiminishing cellularity of the inflammatory tissue even after a lapse of nearly two years. This difference in the reactivity of lung tissue in the rats on the one hand and in hamsters on the other is not unique to chrysotile dust inasmuch as similar and quite comparable differences in these two species have been noted in their reactivity to quartz dust.¹⁰

It is highly probable that interspecies differences in the efficiency of the pulmonary clearance mechanism play an important role in the susceptibility of the different species to certain pulmonary diseases. It is recognized, for example, that horses and mules working during their lifetime in mines exposed to quartz dust will have accumulated a negligible amount of silica in the lungs and will demonstrate no silicosis;¹¹ whereas miners in the same workings will have varying degrees of silicosis as well as a significantly elevated pulmonary silica content. We have recently exposed rats and mice simultaneously to quartz dust in the same inhalation chamber for the same length of time. All animals were killed immediately after the end of the dust exposure. Well-defined silicotic nodules were present in the rat lungs; whereas, the mouse lungs were absolutely normal, and no acid-insoluble dust could be demonstrated in the mouse-lung sections after microincineration (unpublished data).

The above observations are relevant to the present investigation insofar as such interspecies differences tend to make extrapolation from animal data to human disease unreliable. The questions to be resolved are whether the efficiency of the clearance mechanism of man approximates that of the