

renders the fiber incapable of producing fibrosis. It thus appears that the coating is a protective mechanism. This thought was expressed by Beintker as early as 1934¹⁶ (15).

THEORY OF IRRITANT ACTION

Two hypotheses have been proposed to explain the tissue irritation and reaction caused by asbestos fibers: the chemical and the mechanical. In the chemical theory, which is based upon experience with quartz, it is assumed that the asbestos minerals dissolve in the body fluids and that in this process their bases are leached away to leave silica in a form capable of irritating tissues. According to this hypothesis asbestosis would be merely an indirect silicosis. Several facts make the chemical theory untenable: intratracheal injections of brucite fibers, which had a silica content of only 0.90 per cent, caused a typical fibrosis like that produced by the asbestos minerals; free-silica particles increase in potency as the particle size becomes less, but asbestos fibers shorter than about 10 to 20 microns are relatively innocuous; aluminum hydroxide neutralizes the irritating effect of quartz but not of asbestos; serpentine has the same chemical composition as long-fiber chrysotile but it produces only an inert type of tissue reaction; there is a wide range in the chemical composition of the minerals which do cause asbestosis (table 19). In view of this evidence it seems more likely that asbestosis is caused by an unusual mechanical irritation from long asbestos fibers, this

¹⁶
16. Beintker, U.: Über die Asbestosiskörperchen. Bemerkungen zu der Arbeit von Hoyer. Virchows Arch. f. path. Anat. 293: 627, 1934.