

patient should be examined with sufficient frequency and detail to determine the exact status of the disease.

The type of routine x-ray examination used will be a major factor in determining the cost of the program to the medical department. Most roentgenologists feel that the standard 14 × 17-inch film is necessary for definite diagnosis. However, as a screening procedure, several less expensive films are available. Paper film is sometimes substituted for ordinary transparent film. Roentgenograms of this type usually show too little detail to be satisfactory even as a screening process. Roentgenograms of the 35-mm., or 4 × 5-inch, size also show insufficient detail to be dependable in the dusty trades and are not recommended by the author. Only 14 × 17-inch films of the very best quality technique should be insisted upon for the periodic observation of employees in the dusty trades. Stereoscopic and lateral films are not necessary as a routine, but may be very useful at times when a differential diagnosis becomes necessary.

The decision as to whether or not a workman should continue at his job (either on a new job or for his old employer) is a serious responsibility of the examining physician. He not only must have a thorough understanding of working conditions in the particular occupation and plant of the worker under consideration, but also an appreciation of public health and moral responsibility to the individual worker, to his associates, and to the employer.

It unfortunately is true that most physicians who have had little experience with such matters tend to think first of separating a worker from his job and usually so advise him. Instead of preventing disability, such ill-considered advice frequently leads to marked shortness of breath based on fear. Unless a worker has active tuberculosis, he should be kept at his regular jobs and every effort made to reduce his dust intake to a minimum. He should be assured that his lung changes will not progress to a dangerous stage with the improved dust control. In the author's experience,⁷² fear caused by well-meant but exaggerated advice has caused more disability than the lung lesion itself. To many workers, an unexplained diagnosis of silicosis or asbestosis is just as serious as is a diagnosis of cancer. But more workers will be saved from a state of semi-invalidism by reassurance and optimism than will be benefited by pessimism and too early removal from their jobs.

c. Aluminum Prophylaxis and Therapy. The use of aluminum for the prevention of silicosis was first reported by Denny, Robson, and Irwin in 1937,⁷³ and about the same time similar investigations were undertaken by Gardner and his associates. Since that time considerable attention has been focused on aluminum and its compounds both in laboratories and in clinics.

Tabershaw and Tebbens⁷⁴ summarized the principles that have evolved from laboratory work on both finely divided metallic aluminum and amorphous hy-

drated alumina as follows: If alumina and silica localize in the same phagocytic cell, the effect of the silica is neutralized. Further progression of the tissue reaction characteristically produced by silica is then arrested. Mature silicotic nodules become static, and immature lesions (inflammatory and early fibrous changes) are resolved. Aluminum may remain in the tissue and protect the individual for a long period—over a year. Aluminum does not ordinarily produce toxic effects in the tissues, although it appears to increase the susceptibility of experimental animals to tuberculosis when large doses are given.

An occasional allergy to aluminum has been reported,⁷⁵ but this is apparently a rare occurrence. Denny, Robson, and Irwin have preferred to use metallic aluminum, but Gardner has found that certain hydrated aluminas are more effective. The use of aluminum by physicians for therapeutic or prophylactic purposes makes only metallic aluminum available. Some investigators, notably Hannon,⁷⁶ have reported marked success in the treatment of patients with severe disability. However, when purely objective criteria have been used to measure disability, the results have been somewhat less striking. For example, in a controlled experiment by Berry,⁷⁷ 9 out of 35 silicotics were treated only with inhalations of room air, but they thought they were getting the same inhalations of aluminum dust as were the other 26 silicotics. All of the 35 had similar degrees of disability and similar symptoms referable to it. An impressive degree of subjective improvement was reported by the majority of the individuals in both groups and no objective improvement was noted in any of the 26 who had inhaled aluminum. This study illustrates the tremendous psychological effect of therapy and the need for controlled studies before any conclusions can be drawn on symptomatic improvement with any form of therapy.

In view of the controversial aspects of both the prophylactic and therapeutic use of aluminum in silicosis, the Council on Industrial Health⁷⁸ of the American Medical Association issued the following statement in 1946:

The dissemination of reports on the effects of aluminum powder in the prevention and treatment of silicosis has aroused widespread interest and a demand for an authoritative statement regarding its value. At the present time the following statement would seem to be warranted on the subject, however, to such modification as future knowledge and experience may indicate.

In experimental animals the prophylactic use of aluminum inhibits the toxic action of relatively pure quartz.

In man industrial dust exposures often involve mixtures of various minerals in addition to quartz and other environmental variables to which experimental animals are not subjected. Therefore human silicosis usually develops more slowly and is often modified in type. Only prolonged unbiased observation, with adequate control cases, will demonstrate whether the prophylactic results obtained with animals are applicable to man.

W. C. Collier, *J. Ind. Hyg. Toxicol.*, **26**, 7 (1944).

W. C. Hannon, *Trans. Can. Inst. Mining Met.*, **48**, 180 (1944).

W. C. Berry, Aluminum therapy in silicosis, *Am. Rev. Tuberc.*, **57**, 557-573 (June, 1948).

Council on Industrial Health, Aluminum in the prevention and treatment of silicosis, *Am. Med. Assoc.*, **130**, 1223 (April 27, 1946).

⁷² O. A. Sander, Rehabilitation of persons with pulmonary dust diseases, *Arch. Ind. Hyg. and Occupational Med.*, **4**, 541-548 (December, 1951).

⁷³ J. J. Denny, W. D. Robson, and D. A. Irwin, *Can. Med. Assoc. J.*, **37**, 1 (1937), 40, 213 (1939).

⁷⁴ I. R. Tabershaw and B. D. Tebbens, *J. Ind. Med.*, **14**, 709 (1945).