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Asbestos Health Problems

I would like to call your attention to an article entitled, "X-ray Diffraction and Spectrographic Analysis in Pneumoconiosis," appearing in the March 1967 issue of Archives of Environmental Health, pp. 412-423. The authors are E. G. Harrison and H. A. Anderson of the Mayo Clinic, Rochester, Minnesota, and G. Koves of the IBM Corporation Development Laboratory, Rochester, Minnesota. The purpose of this article is to point out the fact that X-ray diffraction and emission spectroscopy can be used as diagnostic tools in pneumoconiosis cases. A group of 18 patients was selected for study. In 15 of the cases the possibility of pneumoconiosis had been considered because of a possible occupational exposure to an irritant dust.

The data presented in this paper are not sufficiently detailed to allow the reader to draw his own conclusions, but it does appear that these techniques can be useful as diagnostic aids, particularly in cases involving silicosis. There are, however, many disturbing and inaccurate statements concerned with the cases involving asbestosis. Neither X-ray diffraction nor emission spectroscopy honestly showed the presence of asbestos in any of the cases discussed. A very low concentration of the minerals in the tissue would make such determinations difficult. Electron microscopic methods or the use of an electron microprobe might be more fruitful for fiber identification. The main problem appears to be a gross lack of knowledge concerning the nature of the various forms of asbestos. The following quotations from the article are included to point out this problem.

From page 418,

> X-ray diffraction analysis gave positive identification of polarizing particles in the specimens from eight of the 13 cases of pneumoconiosis. Silica was specifically identified in three of the six cases of silicosis and in three of the five cases of asbestosis. Also, calcium silicate (three cases), hornblende (one case), and alumina (one case) were identified in the five cases of asbestosis. ---- Calcium carbonate or phosphate was noted in several cases.
>
> When data from emission spectrograph were compared with the X-ray diffraction data, it was seen that usually a positive X-ray identification was accompanied by very high assigned numbers representing comparative values, rather than actual quantitation of elements which are components of the compounds identified by X-ray diffraction.

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From page 420, involving a detailed case study of an asbestos insulator

> Polarized microscopy disclosed doubly refractile fibers and particles with a symmetric extinction pattern. X-ray diffraction analysis indicated that the crystalline material was calcium silicate and silica, confirming the histopathologic diagnosis of asbestosis.

From page 421, under "Comment"

> In the asbestosis cases the positively identified spectra showed mostly complex silicate compounds in which the silicon does not appear either in a pure metallic form or as simple silica (SiO_2), but in more complex sodium, calcium or aluminum silicate compounds, or combinations of these. Many of these complex silicates are found in various forms of asbestos.

The above statements point out the authors' ignorance of the chemical composition of chrysotile (magnesium silicate) or amosite (iron-magnesium silicate) which are the two most commonly used forms of asbestos.

As a partial solution to this recurring problem, I would like to suggest that JM consider the publication of a simple, factual article on the nature of, and characterization of asbestos minerals in a journal which would be readily available to the members of the medical profession. Such a journal might be the Archives of Environmental Health.

It might be more advantageous if such an article appeared as a cooperative effort between a JM author and one of the physicians in the Industrial Hygiene Association we are now working with.

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Attachment

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