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DEVELOPMENT OF RADIOGRAPHIC ABNORMALITY IN CHRYSOTILE MINERS AND MILLERS

Gail Eyssen

Department of Epidemiology & Health, McGill University, Montreal

It has been known for about fifty years that inhalation of asbestos dust can lead to radiologic shadows different from those associated with silicosis and coal workers' pneumoconiosis, but only the latest international classifications require their detailed recording. Five readers who had helped to develop the ILO U/C (1971) classification used it for assessing five films for each of 270 male workers in the Quebec chrysotile producing industry. Each man's films spanned, fairly evenly, approximately twenty years of employment. The readers worked separately, assessing the films twice, once side-by-side in known temporal sequence, and once in independent, randomized, sequence. For this report, we wished to describe the first pneumoconiotic appearances, and have considered only the side-by-side readings.

An "attack" was counted when a reader recorded as normal a subject's first film in the study, but considered that a later film revealed small parenchymal opacities, large opacities, and/or pleural thickening affecting the chest walls or the definition of diaphragm or cardiac outline. (Obliteration of the costo-phrenic angle was considered non-specific, and pleural calcification a phenomenon associated mainly with material from certain geological strata only.) The readers differed greatly in the number of subjects *eligible for attack*, ie normal on first film, the proportion varying from 53% to 97%. They also differed in the proportions *attacked among those eligible* (from 24% to 96%). The first abnormal radiograph usually showed small opacities or thickening of the chest wall (or both), but it was rare for the diaphragm or cardiac outline to be considered ill-defined on the first abnormal film; large opacities were never seen (see Table 1).

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When parenchymal change was recorded in the first abnormal film, the proportions of the two *forms* of opacity, rounded and irregular, were roughly equal according to three of the readers, but were most commonly irregular according to the other two (Figure 1). The small opacities were distributed over the lung zones in rather different patterns depending on reader, but there was a slight tendency for irregular opacities to be recorded less often in the upper zones than elsewhere, and for the right lung to be affected more than the left. Thus, rounded small opacities were recorded in a higher proportion of cases than had been expected in the films of asbestos workers, and opacities of this form were not seen primarily in the upper zones of the lung.

Pleural thickening of the chest wall was usually seen on the left side by two readers, on the right by two, and equally on left, right and bilaterally by the fifth.

It is clear that there was little consistency between observers in their assessment of earliest changes. However, even in the independent assessment of single films, these readers showed much greater observer variation than when they had participated in the initial trials of the repeatability of the classification. There are reasons to believe that disagreements would have been even greater had the independent randomized readings been used for the present purposes. Obviously, the many problems in the reading of radiographs of the pneumoconioses discussed by *inter alia* the National Blood, Heart and Lung Institute Workshop on "The Chest Radiograph as an Epidemiologic Tool" [illegible] enhanced rather than diminished where serial films have to be assessed.

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TABLE 1

FIRST ABNORMAL FEATURES

	Reader				
	A	B	C	D	E
Number of subjects eligible for attack	239	254	245	263	143
% of total	88.5	94.1	90.7	97.4	53.0
Number of subjects attacked	93	104	125	63	137
% of those eligible	38.9	40.9	51.0	24.0	95.8
Percentage of subjects attached with:					
Parenchymal change only	36.6	49.0	82.4	31.7	38.0
Pleural Thickening only	41.9	26.0	14.4	58.7	34.3
Ill-defined cardiac outline or diaphragm, with or without pleural thickening but without parenchymal change	9.7	13.5	1.6	3.2	2.9
Parenchymal and pleural changes	11.8	11.5	1.6	6.3	24.8
Total	100	100	100	100	100

Figure 1

SMALL OPACITIES

Percentage distribution of lung zones affected by small opacities in the first abnormal film.

Reader

	A		B		C		D		E	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Upper zones	11.7.0	4.8							0.6	0.1
	4.3	1.6							6.1	2.5
Middle	13.4	11.8							1.3	1.3
	7.5	7.5							20.2	16
Lower	12.3	10.2							0.9	0.3
	10.7	9.1							25.2	23.3

Number of subjects with:

Small rounded opacities □ 26 14 56 11 5

Small irregular opacities ▨

Table for Figure 1
SMALL OPACITIES
Percentage distribution of lung zones affected by small opacities in the first abnormal film.

Lung zones	Reader A		Reader B		Reader C		Reader D		Reader E	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Upper	7.0	4.8	4.8	4.1	6.7	5.7	15.6	15.6	0.6	0.9
	4.3	1.6	7.5	7.2	1.0	1.2	9.4	4.7	6.9	2.5
Middle	13.4	11.8	4.1	3.4	12.8	13.1	10.9	10.9	1.3	1.3
	7.5	7.5	14.4	14.4	5.4	6.2	7.8	4.7	20.2	16.4
Lower	12.3	10.2	3.4	3.1	11.8	11.3	1.6	1.6	0.9	0.3
	10.7	9.1	17.1	16,4	12,6	12,3	7,8	9,4	25,2	23,3