PLAINTIFF'S EXHIBIT
UC-2371

MEDICAL SURVEILLANCE OF ASBESTOS WORKERS

Paper to be presented at Fourth International Conference on Asbestos, at Turin (Italy), May 26 to May 30, 1980

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INTRODUCTION

There is no cure for asbestosis, the outlook for the patient with lung cancer is very poor and diffuse malignant mesothelioma of the pleura or peritoneum is invariably fatal within a short period of time after diagnosis. In view of this gloomy future for the affected worker, what can the physician now working in industry do to intervene or prevent undue suffering on the part of currently exposed individuals?

The physician can be actively involved, become thoroughly familiar with the physical and chemical properties of asbestos, know the manufacturing details and study the plant layout in depth. Having insight into the manufacturing process and working conditions in the plant the doctor should be well equipped to deal with the problems which arise in the management of the health of people at work. Practical experience gained from working in industry is of little avail unless linked to a thorough knowledge of the etiology, pathogenesis, epidemiology and therapy of the diseases involved. The physician should acquire a working knowledge and appreciation of the theory and practice of industrial hygiene, including an understanding of sampling and monitoring procedures. Fortified by this experience and know-how, the course to be charted should become clear and his ship will not falter on the many rocks in its path!

It stands to reason that industry wants to employ people who are suited to the tasks required of them and that they should not suffer injury or illness as a result of the work they are called upon to do. This paper will discuss the subject of medical intervention and its role in the prevention of

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asbestos-related diseases. A logical sequence will be followed starting with pre-placement examinations and concluding with post-retirement or post-severance examinations. The methods to be employed will not be described in detail, only the purpose and objectives of each type of examination.

PRE-PLACEMENT MEDICAL EXAMINATION OF ASBESTOS WORKERS

The purpose of the pre-placement medical examination is to determine the suitability of a job for an individual and the suitability of the individual for the job, having regard to known facts relating to asbestos and health.

The findings of such an examination are used to establish a medical data base for long-term follow-up, provide guidance to management and employees relating to job suitability based upon defined selection criteria, and to counsel the job applicant regarding his suitability or otherwise for employment in an asbestos-exposed occupation.

The data base for long-term follow up is established by recording essential identification characteristcs and initial medical examination findings (Tables 1. and 2.).

Guidance is provided to management and the employee relating to job suitability based upon defined selection criteria, namely:

(1) Contra-indications to employment in <u>any</u> job where asbestos is used are: a history of chronic chest complaint and significant exposure in other hazardous dusty jobs in the past.

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An applicant with the above mentioned contra-indications may be accepted for work in asbestos areas if medical examination reveals no physical, physiological or radiological abnormalities, and if the dust levels in the area are 50% below the currently accepted statutory permissible exposure levels. This is a purely arbitrary judgment and there is currently no known safe threshold for a carcinogen such as asbestos. If the individual is able to wear a respiratory protection device, basing this decision upon medical findings such as physiognomy and results of pulmonary function tests, then the risk, if any, will be further reduced.

The job applicant must be counselled at the time of his first interview in the medical department regarding the known facts about asbestos-related diseases. Audio-visual aids, leaflets, demonstrations and personal interviews should be used to impress upon the employee the need for care and caution in the handling of asbestos and asbestos products. It is essential to emphasize the special risks he or she will run if the habit of smoking cigarettes is not discontinued.(1.)

The pre-placement medical examination is an essential tool for use in the medical supervision of asbestos workers because it establishes the principles upon which future management will be based. It gives the prospective applicant an insight into the seriousness of the problem and enables the physician to recommend suitability, limited suitability or total unsuitability of the individual for the job. The opportunity which preplacement physical examination provides for the medical staff to counsel the individual and establish raport is unique and should

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not be missed. This period in the career of the job applicant provides the best opportunity for the recording of identification details and verifying them, in order to establish the data base for long-term follow-up. The format of the examination and recording documents should be such that it is suitable for storage and retrieval by electronic data processing equipment, thus making it more amenable to epidemiological study and analysis.

PERIODIC MEDICAL EXAMINATION

The purpose of the periodic medical examination is to reevaluate the job and the individual's suitability to continue doing the same job. Medical findings can be recorded on an ongoing basis and allow comparison from one year to the next. Changes in physical condition, physiological status or radiological appearances, which may or may not be job related are hopefully detected at an early stage when intervention will result in withdrawal from further exposure if indicated or provision of necessary therapy. Findings can be subsequently used for epidemiological and statistical analysis to determine exposure-response relationships and will hopefully provide the basis for industrial hygiene standards to protect exposed persons. The physician can utilize the knowledge gained from the periodic medical examination of employees to provide guidance to the worker and to management regarding the possible effects of exposure in a specific job.

Records of medical findings should be relatively simple to maintain

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provided that a standardized system is used which follows on from year to year. The essential requirements for the periodic medical surveillance of asbestos workers are as follows:

1. Occupational history in detail, i.e., job changes, changes in department, etc.
2. Exposure details (i.e., fiber types, product, etc.) and exposure levels.
3. Respiratory Symptoms (Questionnaire).
4. Serial Lung Function Test results.
5. Chest roentgenograms, comparing recent and past films.
6. Record of smoking habits and other social habits, drugs, etc.

Physical examination should concentrate on eliciting signs of pulmonary fibrosis such as bilateral end-inspiratory fine crackles at the lung bases, finger-clubbing and breathlessness. Attention should be paid to the development of any chest compaints since the previous examination and pleural effusion or pleural thickening should be sought if the history is suggestive.

In the follow-up of workers, the measurement of ventilatory capacity can easily be performed using robust, inexpensive, reliable equipment. The guidelines published by the American Thoracic Society for the performance of these tests, if adhered to, should insure calibration of instruments, training of technicians and reproducibility of results.(2.)

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Where facilities exist for more complete studies they should at least include measurement of lung volumes and the gas transfer factor for carbon monoxide as measured by the single-breath method. Exercise tolerance should be measured under the supervision of a physician.

The aim of radiological surveillance of asbestos workers should be to detect early changes, such as the development of pleural thickening, pleural calcification and pulmonary fibrosis so that the employee can be advised and early removal from further exposure take place. Asbestos workers are a high risk group for the development of lung cancer, especially if they are also cigarette smokers, and particular attention should be paid to this risk when reviewing their chest X-rays.

The ILO/UC 1971 International Classification of Radiographs of the Pneumoconioses(3.) is recommended for use in epidemiological studies of asbestos workers. It is necessary, however, in the clinical management of employees, to rely upon an interpretive narrative, rather than a coded system, for the direct day-to-day decisions that have to be made.

Chest radiography is probably the most useful surveillance tool we have, but it is also one of the most difficult to utilize.

Medical surveillance systems must be so designed as to allow for record linkage to industrial hygiene control programs. A discussion

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on this subject is outside the scope of this paper, but is referred to for the sake of completeness. Epidemiological studies which do not have exposure data incorporated in their design, provide little help in ultimately pronouncing on the adequacy, or otherwise, of dust control measures which have been adopted.

Each worker examined must be given the results of his or her examination, must acknowledge receipt of the information and must signify it has been understood. If a job change is indicated, the reasons for it should be precisely stated, but the decision as to whether this advice is accepted or not must be left to the employee.

Management must always be informed, with the consent of the employee, when an adverse medical opinion is expressed. The disposition of the case, in the light of the medical advice which management receives, must hinge upon agreement reached between employer and employee, trusting that both parties have a full understanding of the facts and of the consequences. Management must also be advised of the employee's continued suitability to perform current duties if no adverse health effects are found.

The value of the periodic medical examination depends upon the manner and thoroughness with which it is conducted. It will only serve its purpose as an aid to early diagnosis if the format is standardized as much as is possible, if the strictest attention is paid to the detail of techniques

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employed in radiology and pulmonary function testing, and if it is borne in mind that the employee's attitude to periodic check-up is different from the attitude he or she had towards the preplacement medical examination.

In the sections above, dealing with the medical examination parameters, mention was not made of sputum cytology. It has been proposed in the United States that this should be performed routinely on persons with 10 or more years of exposure to airborne concentrations of asbestos fibers or who are 45 years of age or older.(4.) According to the authors of Section IV of the American Thoracic Society's Epidemiology Standardization Project, "Early data from studies of smoking men at high risk of lung cancer indicate that only one fourth of asymptomatic lung cancers are detected by sputum cytology and the remainder are detected by chest radiography".(5.)

POST RETIREMENT OR POST SEVERANCE EXAMINATIONS

The surveillance of the asbestos worker should ideally not cease when he or she leaves employment, for whatever reason, but every effort should be made to continue the process of follow-up for the rest of the individual's lifetime.

The follow-up of retirees should be administratively easier than that of employees whose term of employment is severed prior to retirement, because the former will probably qualify for retirement pensions and remain in

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touch with the company, whereas contact with the latter will probably be lost.

The follow-up of retirees should preferably take the form of a health questionnaire only, with an annual reminder to each one to see a physician and have a chest X-ray. The aim is to detect lung cancer as early as possible in the hope that therapy might be available to prolong life and alleviate suffering.

With regard to other employees, whose employment terminated prior to retirement, a system should be devised whereby each one, on leaving, is given a carefully worded notice as a reminder to continue with annual examinations and designed to be given to a family physician with the information that the individual had previously been under surveillance as an asbestos worker.

CONCLUDING REMARKS

The prevention of asbestos-related diseases depends upon engineering technology and dust control. The physician however is ideally placed to intervene at the interface between the worker and his work. The medical examination program is merely one part of the total effort required to safeguard employee health and without the collaboration of management and the exposed workers, cannot achieve significance. As long as the program is built upon mutual trust and no attempt is made to keep either

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employer or employee in ignorance of the facts, it will succeed in providing an individual service as well as monitoring the overall effects of exposure on the health of the work force.

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TABLE 1.

Identification characteristics required to establish a data base for long term follow-up of asbestos workers.

A. 1. Name (include maiden name for married women)
   2. Identification number (social security number, etc.)
   3. Date of Birth
   4. Place of Birth
   5. Address

B. 1. Name of spouse
   2. Identification number of spouse (social security number, etc.)
   3. Spouse's date of birth

C. 1. Names, dates of birth, addresses and identification number of children

D. 1. Employee's company I.D. number (clock no., etc.)*
   2. Employee's occupation (job description, including raw materials handled)
   3. Latest dust levels in job and department

*The employee I.D. number should never change and should be reallocated to the same employee upon rehiring after termination of employment.

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TABLE 2.

Minimum requirements to be recorded to establish a data base for long term follow-up of asbestos workers.

Complete, detailed, occupational history since leaving school

Family history

Smoking history

Social history (drugs, alcohol, etc.)

Previous illnesses of note, especially respiratory ailments

Detailed respiratory symptoms history (MRC or ATS Respiratory Symptoms Questionnaire)

Vital and physical signs

Special investigations: 17" X 14" Postero-anter chest roentgenogram*

Measurement of lung function (ventilatory capacity, lung volumes, gas transfer, etc.)

Sputum cytology (value not proven in screening)

Measurement of angle between nail and cuticle to document appearance of clubbing of fingers.

*Oblique views, and occassionally lateral views, may be required to clarify pleural abnormalities.

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