NATIONAL ASBESTOS REGISTERS

Annual Report 1994-95

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SUMMARY

This report reviews notifications made to the national asbestos medical panel for the period March 1992-November 1994. A total of 486 cases were reviewed, which included:

- 69 cases of mesothelioma
- 38 cases of lung cancer
- 81 cases of asbestosis
- 229 cases of pleural abnormalities

The relatively smaller number of lung cancer cases compared with mesothelioma cases suggests that occupational factors are underestimated in the diagnosis of lung cancer.

The diagnosis of asbestosis is not clear-cut, with different criteria being proposed by different authorities. The medical panel takes the view that, as the register is a public health register, the diagnosis is satisfied by the criteria outlined by Gilson.

Lung function abnormalities among asbestos-exposed workers with pleural plaques is another issue of interest and debate. A review and update of information of all confirmed cases of pleural plaques is currently under way.

BACKGROUND TO THE REGISTERS

The National Asbestos Registers were established in March 1992 in line with the recommendations made to the Minister of Labour, by the Asbestos Advisory Committee.

Formation of the Asbestos Advisory Committee

The Asbestos Advisory Committee was established in October 1990 as an ad hoc body to report to the Minister of Labour on issues relating to the health effects and use of asbestos in New Zealand, adequacy of controls and legislation and clarification of the legal entitlements available for affected workers. This followed increasing public concern about the past and present effects of asbestos on workers, former workers and their families.

Establishment of the National Asbestos Registers

Recommendation 4 of the Report of the Asbestos Advisory Committee[1] to the Minister of Labour advised:

> *That an asbestos medical register be established for people who have been significantly exposed to asbestos. OSH should be the organisation responsible for establishing, maintaining and funding the medical register.*
>
> *The medical register should be in two parts:*
>
> *Part 1 - Those notified as having been exposed to asbestos;*
>
> *Part 2 - Those notified as having an asbestos-related disease.*
>
> *The system should allow movement of the name of a registered person from part 1 to part 2 of the register when indicated.*
>
> *Notifications to part 1 of the medical register were to be made by those who felt that they had been exposed to asbestos, or by people acting on their behalf (and following consultation) such as an employer, union official, relative or friend.*
>
> *Notification to part 2 of the medical register would be done by medical practitioners.*

A Notifiable Occupational Disease System (NODS) was established in 1992 and asbestos registers have been incorporated in that scheme. This was in accordance with recommendation 5 of the Asbestos Advisory Committee.

The Asbestos Exposure Register

The Occupational Safety and Health Service of the Department of Labour (OSH), in association with Electricorp Production, undertook an extensive advertising campaign in March and April 1992. Advertisements were published in all of the major newspapers, and several trade magazines.

The interest generated as a result of this campaign has ensured a high response rate for the exposure register. Notifications have been made by individuals, trade unions, occupational health nurses, doctors, the Asbestos Diseases Association of New Zealand and by some larger companies.

Notifications are directed either to branch offices of OSH or directly to the Registrar.

In recommendation 4, the committee had envisaged that people wishing to be recorded on the asbestos exposure register would have their exposure assessed at an OSH branch. Only those people who were judged as having had "significant exposure" would then be recorded on this register. However, the huge response from those individuals who had been exposed made it impractical to screen registrants in this fashion.

Once a person has notified OSH that they have been exposed to asbestos, an asbestos exposure registration form is sent. The registration form collects information about the individual, their work exposure to asbestos and the state of their respiratory health.

When the form has been completed and returned to the Registrar the details are recorded on a database. The individual is then sent a copy of a special edition of OSH's magazine *Safeguard,* which is dedicated to asbestos and its associated health problems. If the person indicates that they have a family doctor, the doctor is informed that their patient has been included on the asbestos exposure register, and is sent a copy of OSH's booklet *Asbestos Exposure and Disease: Notes for Medical Practitioners.*

The register provides a database of the numbers of people exposed to asbestos through their occupation in New Zealand. OSH is providing information to the people recorded on this register and to their doctors. Through the operation of this register OSH is hoping to raise the awareness of the possible health effects of asbestos exposure among the general public and the medical profession.

THE DISEASE REGISTER

A register for those people notified to OSH as having an asbestos-related disease was also established and is operated under the auspices of the National Asbestos Medical Panel.

The establishment of both this register and the panel has been carried out in accordance with recommendations 4, 5, 6 and 7 of the Asbestos Advisory Committee's Report to the Minister of Labour.

Tenders for the National Asbestos Medical Panel were called for in 1991. A tender was accepted on 31 October 1991. The successful tender came from the group listed below:

W.Glass MBChB DIH FFOM FAFOM (Convenor)
R.Armstrong MBChB (Hons) FRCP FRACP
*R.Beasley MBChB FRACP DM
*J.Crane MBBS FRACP
D.Jones MBBS MRCP FRACP
N.Pearce BSc PhD (Epidemiology)

*Dr Beasley retired upon his appointment as Professor of Medicine at the Wellington Clinical School. Dr Crane joined the National Occupational Asthma Panel.
The first meeting of the panel was held in February 1992.

Professor Glass was nominated as the panel's convenor.

The National Asbestos Radiological Panel was chosen and its members are listed below:

Dr Paul White
Dr George Foote
*Dr Graeme Anderson

*Dr Anderson has retired.

The National Asbestos Medical Panel is responsible for verifying all cases of asbestos-related disease. Once a case has been verified by the panel the personal and medical details of the individual are recorded on a database.

All personal information is stored under conditions of strict confidentiality.

Processes for registering people

Notifications for this register come from two major sources. The first is from doctors whose patients have been diagnosed, or are suspected of having, an asbestos-related disease. The second source of notification is from the individuals themselves.

As this register has been included as part of NODS, most of the notifications from doctors have come on the NODS cards which have been distributed to doctors and occupational health nurses by OSH. Other notifications from doctors have come in the form of letters.

Once a notification has been made to the Registrar, and consent has been gained from the person concerned, relevant medical records and a full occupational history are obtained.

Over the three years since the register began it has already become clear that it is serving many of the functions predicted. It has raised the awareness of asbestos-related diseases among patients and the health professionals. It has improved the diagnosis of asbestos-related disease at all levels of professional speciality. There has developed a growing awareness by general practitioners, in particular, of work as an important determinant of disease. The result has been an upsurge in voluntary notifications of occupationally-related diseases generally to the National Registration Centre at the Occupational Safety and Health Service of the Department of Labour (OSH).

The highlight of 1994 was the asbestos medical panel's sponsorship of a visit by Professor Margaret Becklake from McGill University, Canada. Professor Becklake, who has an international reputation in the field of occupational respiratory disease, has a special interest in asbestos-related disease and the variable lung responses which can develop. Professor Becklake addressed meetings and participated in clinical sessions in Auckland, Wellington and Christchurch. An important outcome of her visit was her willingness to act as a consultant to the medical panel in developing an ongoing research programme.

Data collection

The data collected includes a medical history, an occupational history, chest x-ray, CT scan where available, lung function tests, and pathology reports. The procedure is as follows.

On notification being received by the registrar:

(a) An occupational health nurse visits the patient and carries out a health interview, a detailed occupational and social (including smoking) history.

(b) Relevant medical reports are obtained from general practitioners and physicians.

(c) A recent PA chest x-ray is obtained, and in all cases is read by a radiologist according to ILO (1980) guidelines. CTs are used where available, and on occasions requested.

(d) Lung function data is obtained from physicians' reports or requested from respiratory laboratories. Where this is not possible, results are obtained from a test carried out by an occupational health nurse, using a portable spirometer.

(e) Pathology and post mortem reports are reviewed where available.

Data assessment

The National Asbestos Medical Panel reviews the information obtained, calculates an exposure index (see below) and correlates the medical data.

(a) Exposure Index

An exposure index (D) is calculated from the product of years of asbestos ***exposure*** (A); ***intensity*** of exposure (according to job category), using a 1-5 grading (B); and ***frequency*** of exposure, using a 1-3 grading (C).
Guidelines for calculating this index are shown below.

A = Total years of exposure in any one job.

B = Job category as follows:

Mining, milling and processing = 5
Boiler/lagging, rail carriages, shipyard, spraying insulation = 4
Asbestos cement products, construction, demolition, removal = 3
Electrical, friction products = 2
Loading, driving, environmental = 1

C = Degree of exposure (unprotected):

Continuous (>50% of work) = 5
Intermittent (20-50% of work) = 2
Minimal (<20% or occasional) = 1

D = A x B x C for each job

Exposure index = sum of all Ds

(b) Medical data

Relevant respiratory symptoms and signs are noted from the medical histories, and lung function data is classified into restrictive, obstructive, mixed or normal. Pathology reports are used to confirm mesotheliomas and classify lung cancers.

Classification of diagnostic categories

On the basis of the foregoing, the cases are placed into a primary diagnostic category of:

- Mesothelioma
- Lung cancer
- Asbestosis
- Pleural abnormalities (plaques, diffuse bilateral pleural thickening and effusions).
- Other cancers
- Obstructive lung disease without x-ray changes.

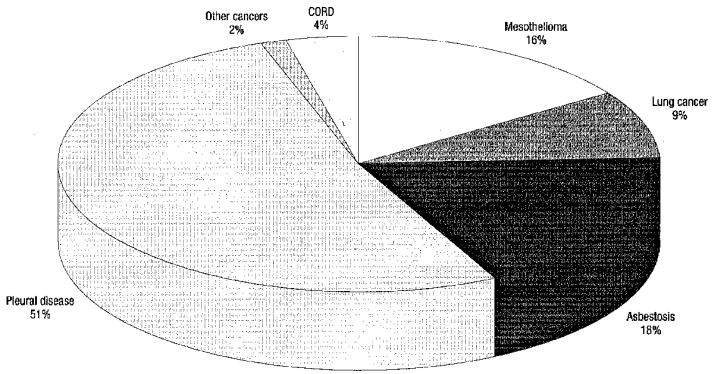
SUMMARY OF REGISTRATIONS

The following summary is based on the 476 cases reviewed over the period March 1992 to November 1994 and included 69 cases of mesothelioma, 38 cases of lung cancer, 81 cases of asbestosis, 229 cases of pleural abnormalities (181 plaques, 32 diffuse bilateral pleural thickening, 16 plaques and thickening), 7 other cancers and 14 cases of obstructive lung disease without x-ray changes.

38 reviewed cases were found not to have an asbestos-related condition (figure 1).

This report contains a review of the first four diagnostic categories: mesothelioma, lung cancer, asbestosis and pleural disease.

Figure 1: Asbestos-related disease reviewed and confirmed by panel 1992-94

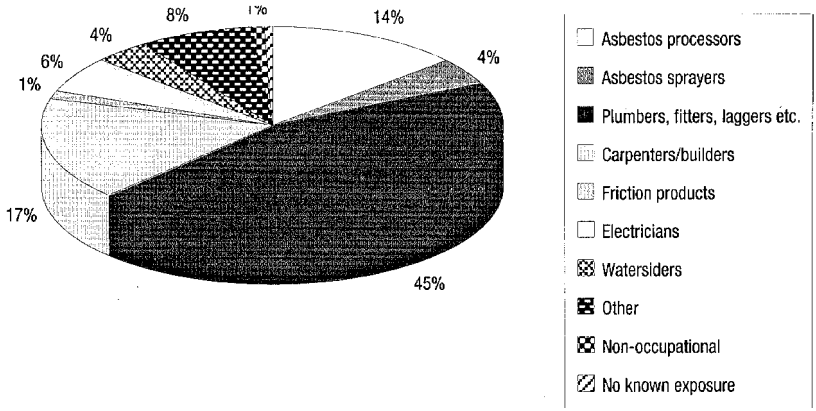


Occupation

Figure 2 looks at occupation for the four diagnostic categories discussed, It is clear that carpenters, plumbers, etc. are together responsible for more than 60% of all cases. These "all purpose" construction workers are an occupational category at risk, and particularly so because, unlike asbestos cement workers, they are not always seen as an obvious risk group.

The non-occupational category refers to cases where an individual's exposure was not work-related. This includes all cases resulting from secondary or environmental exposure. The "no known exposure" category refers to mesothelioma cases where conclusive exposure histories have not been available.

Figure 2: Occupations — all disease categories

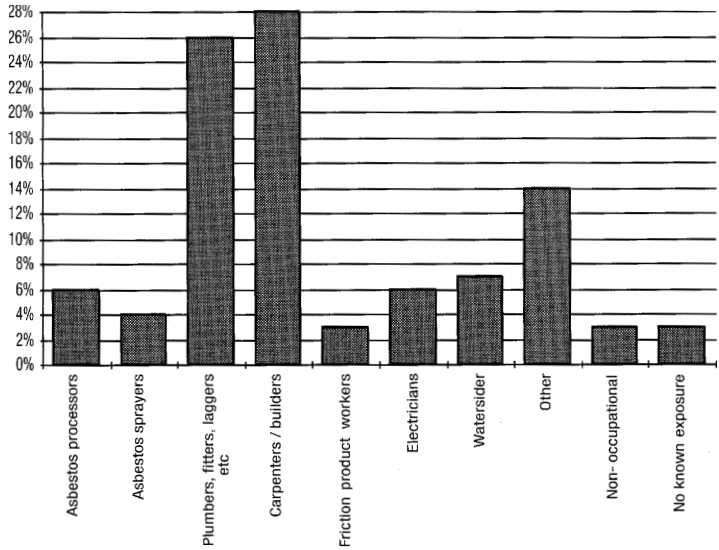


Mesothelioma

69 cases were reviewed, 66 being Caucasian, 2 Maori and 1 Pacific Islander. 62 males and 7 females. The mean age at diagnosis was 63 years (range 35-89). The mean years since first exposure were 42 (range 12-74). The mean exposure index was 163 (range 8 -780).

The occupational classification is shown in figure 3.

Figure 3: Occupations — mesothelioma



There were 8 current smokers, 39 ex-smokers and 16 non-smokers (information was not available for 6 cases).

Radiological changes noted apart from the mesothelioma included: plaques (13), thickening (19).

The three categories: Asbestos processors, plumbers/fitters/laggers, and carpenters/ builders, comprised 60% of all registered cases.

Latency in our study is taken from the recorded date of first exposure to the date of diagnosis. The range was 12 to 74 years with a mean of 42, in 57 of the 69 cases where this information was available.

There was only 1 case with a latency period of less than 15 years and only 3 with a latency period of less than 20 years .

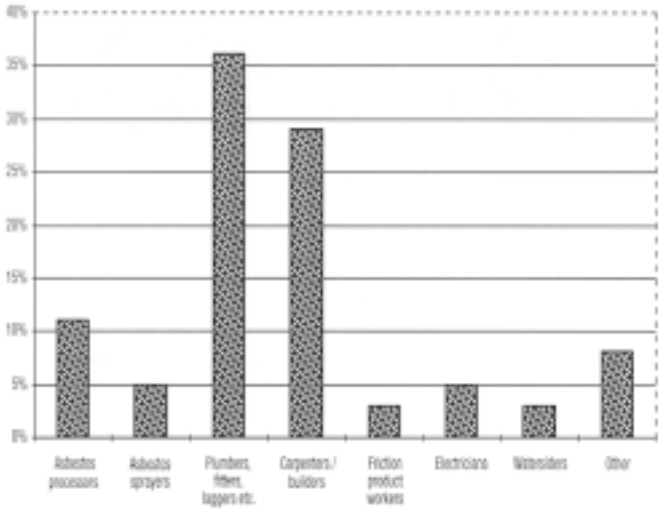
It has been noted[2] that an asbestos exposure history may be lacking with mesothelioma cases. Our experience suggests that with patience and a recognition of the range of likely exposures, it is often possible to obtain evidence of asbestos exposure. In one case the disease developed in a middle-aged woman living in a small rural town. It was revealed that as a teenage girl she had washed the clothes of her older brother who was an apprentice in a railway workshop. Asbestos lagging was used in the repair and maintenance of the boilers, and apprentices frequently had "snowball fights" with the asbestos.

Lung Cancer

38 cases were reviewed, 35 being Caucasian, 2 Maori and 1 Pacific Islander. All were males. The mean ase at diagnosis was 64 (range 42-76), the mean years since first exposure was 39 (range 17-62). The mean exposure index was 159 (range 13-565).

Occupational classification is shown in figure 4.

Figure 4: Occupations - lung cancer



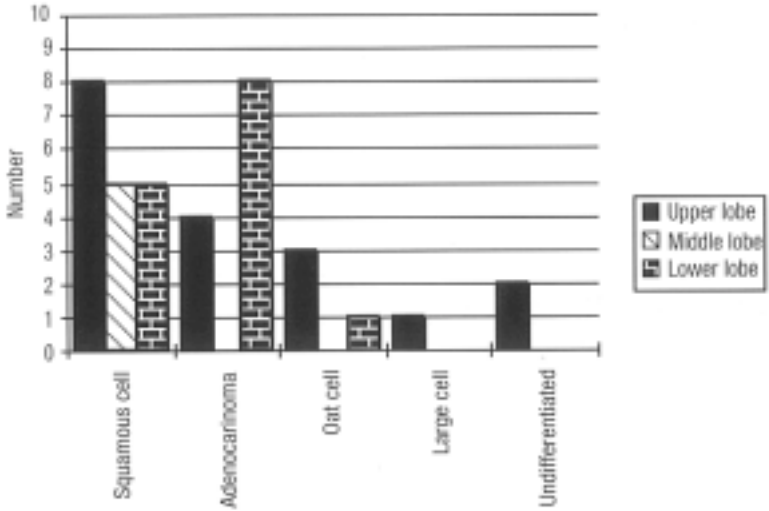
There were 10 current smokers (with a mean of 50 pack years), 25 ex-smokers (with a mean of 14 years since last smoked, and a mean pack year of 30), there was 1 non-smoker.

Radiological changes showed 2 with parenchymal changes, 9 with pleural plaques alone, 3 with diffuse pleural thickening alone and 1 with pleural plaques and thickening.

Histological classification revealed 17 squamous cell, 12 adeno, 4 oat cell, 2 undifferential, 1 bronchiolo-alveolar, 1 large cell, 1 not stated.

Tumour site was as follows: 18 upper lobe (8 squamous, 4 adeno, 3 oat, one large cell and 2 undifferentiated), 14 lower lobe (5 squamous, 8 adeno, 1 oat), 5 middle lobe (all squamous), 1 in both upper and lower lobe and 1 not stated. Figure 5 illustrates both of these features.

Figure 5: Lung cancer type/location



That we have registered twice as many mesothelioma cases as lung cancer illustrates how doctors probably, by and large, overlook the association between lung cancer and occupational exposure. Cigarette smoking is the persistent confounder in lung cancer cases occurring in asbestos exposed workers.

Hyers [3], in a review of the areas of controversy in asbestos-related diseases noted that for non-asbestos workers who smoke, the risk of lung cancer returns to that of a never smoking individual in approximately 15 years after smoking cessation and "it is widely accepted that this slow regression of risk also holds in asbestos-exposed individuals who stop smoking".

A review of our 38 cases showed that of the 25 ex-smokers the mean years since stopping smoking was 14 and 10 of these had stopped for 15 or more years.

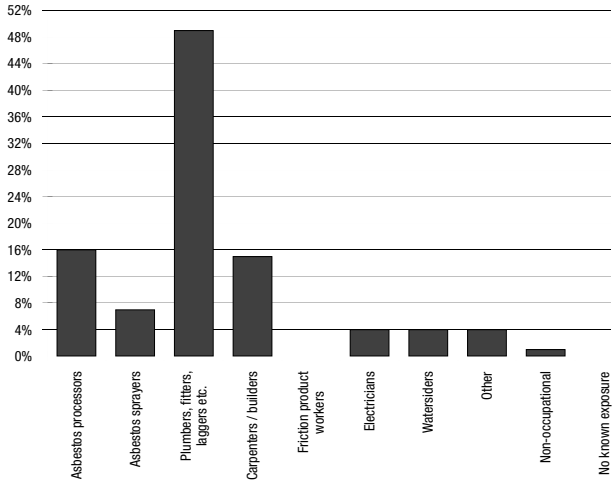
A number of issues of concern exist in recognising lung cancer as asbestos-related. Some authorities require the concurrent presence of asbestosis visible on radiography, while others require either radiological asbestosis or microscopic evidence of fibrosis. With the public health nature of this register neither of these view points have been accepted. All cases of lung cancer occurring to asbestos exposed workers have been included.

Asbestosis

81 cases were reviewed, 80 were Caucasian and there was 1 Pacific Islander, 79 were males. The mean age at diagnosis was 61 (range 40-85), the mean years since first exposure was 39 (range 15-71). The mean exposure index was 194 (range 14-720).

Occupational classifications are shown in figure 6.

Figure 6: Occupations — asbestosis



There were 10 current smokers, 55 ex-smokers and 13 non-smokers (accurate smoking histories were not available in 3 cases).

Radiological changes showed 47 with pleural plaques, 12 with pleural thickening and 22 with both.

Of the 81 asbestosis cases, 70 were categorised by ILO classification, others were categorised on the basis of CT, HRCT or pathology where available.

The profusion score for the 70 cases so graded is shown in figure 7. The nature of the opacities was strongly dominated by an s/t shadowing pattern, figure 8. The dominance of irregular opacities is surprising in view of the varied and mixed exposure to workplace dust in general, including asbestos.

Figure 7: ILO grading of asbestosis cases (n=70)

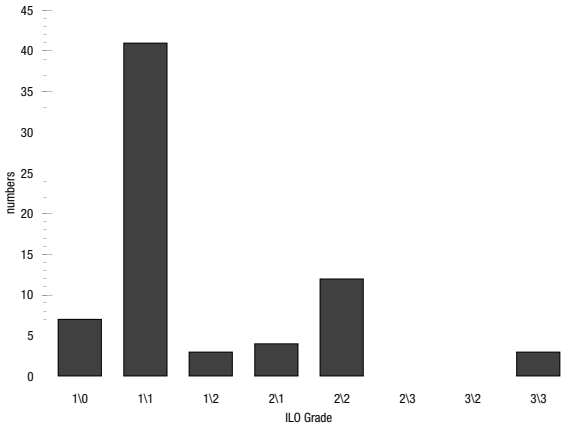
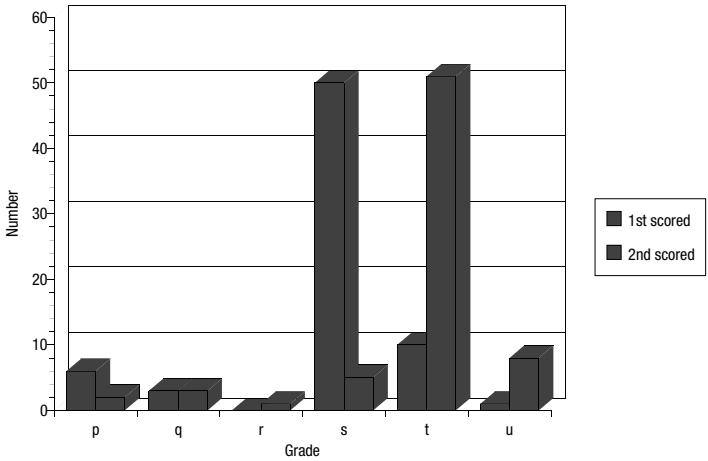


Figure 8: ILO opacity grading (dominant 1st, n= 70)



An important issue with this disease is "What criteria constitute a diagnosis of asbestosis?". This issue is dealt with in some detail in appendix A. The main point of discussion is the difference between a clinical diagnosis of asbestosis and a diagnosis suitable for use in a national database where the inclusion of patients with early disease is desirable.

The definition of JC Gilson[4] in his review of asbestos-related lung conditions in the ILO encyclopaedia has been chosen by the panel for the reason stated above and is as follows.

a. A history of significant exposure to asbestos dust rarely starting less than 10 years before examination;

b. Radiological features consistent with basal fibrosis (1/0 and over, ILO 1980);

c. Characteristic bilateral crepitations;

d. Lung function changes consistent with at least some features of the restrictive syndrome.

Gilson notes that not all criteria need to be met in all cases but that (a) is essential, (b) should be given greater weight than (c) or (d). However, occasionally (c) may be the sole sign. Further he notes that although the restrictive syndrome is the commonest pattern (about 40%), in about 10% of cases airway obstruction is the main feature and in the remainder a mixed pattern is seen. This is thought to be largely due to the confounding effects of cigarette smoking.

In the 81 asbestosis cases:

- All had a significant exposure history with a mean exposure index of 194 (range 40-720).
- Mean latency was 39 years with a range of 15-71 years.
- All cases were classified as ILO 1/0 or greater by the panel's radiological consultant. (The majority being 1/1 or greater.)
- Lung function changes are shown in table 1 below, and reflect the combined effects of asbestos, other workplace dusts and cigarette smoking.
- Diffusion capacity was reduced in 25 cases (31%).
- Detailed clinical examination results were not always available from the records, thus the presence of crackles was not measurable.

Lung function changes are recorded in the register based on the availability of data either from respiratory laboratories, respiratory physicians, or occupational health nurses. The results as reported are shown in table 1.

The numbers in our report are small but confirm that the classical restrictive picture does not dominate, with obstructive, mixed, and normal patterns all occurring.

Table 1: Asbestosis cases: Lung function and smoking habit

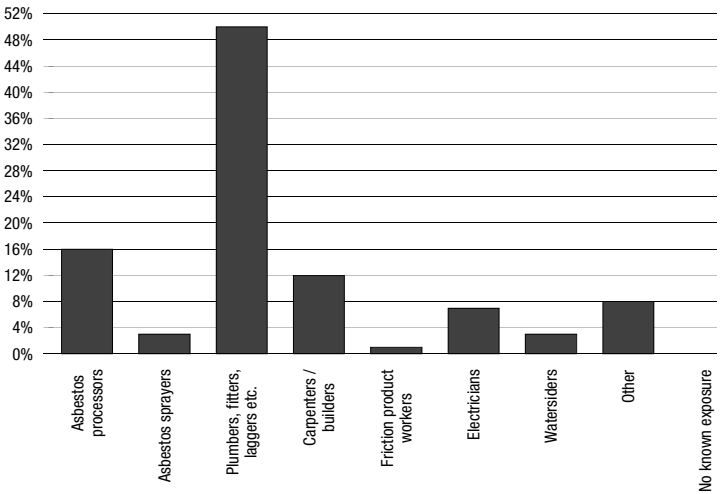
Smoking habit	*Normal*	*Restrictive*	*Obstructive*	*Mixed*	*Unknown*	*Total*
Current	1	3	1	3	2	**10**
Ex	8	17	11	10	9	**55**
Non	3	6	0	2	2	**13**
Not recorded	0	0	0	1	2	**3**
All	**12**	**26**	**12**	**15**	**15**	**81**

Pleural abnormality

This category includes pleural plaques, diffuse pleural thickening, chronic fibrosing pleuritis and pleural effusions. It does not include pleural disease occurring together with mesothelioma, lung cancer or asbestosis.

229 cases were reviewed. 222 were Caucasian, 3 Maori, and 4 Pacific Island. All were males. The mean exposure index was 177 with a range of 6 - 704. Occupational classifications are shown in figure 9.

Figure 9: Occupations — pleural abnormalities



There were 25 smokers, 135 ex smokers and 64 non smokers, (accurate smoking histories were not available in 5 cases).

Table 2 shows lung function normality or abnormality according to asbestos exposure and smoking habit. Abnormal lung function includes obstructive, restrictive or a mixed pattern as recorded in the database. Numbers are too small to separate out the different types of lung function abnormality here. The expected association of tobacco smoking with abnormal lung function is seen. The other observation of interest is that abnormalities in lung function are found in non-smokers and are associated with greater asbestos exposure. More research will be done into this finding at a later date.

Table 2: Lung function normality or abnormality according to asbestos exposure and smoking habit

	Mean asbestos exposure	
Smoking category (Nos.)	*Normal lung function*	*Abnormal lung function*
Non-smokers (34)	124 (22)	232 (12)
Ex-smokers (68)	180 (35)	200 (33)
Smokers (13)	181 (4)	143 (9)

Over recent years increasing interest has been shown in regard to lung function abnormalities in asbestos workers with abnormal pleural changes. Kilburn and Warshaw[5] have reviewed the debate in this area and have published findings indicating a continuum of lung function changes with asbestos exposure. They have suggested that expiratory flow limitation starts after asbestos exposure and becomes detectable by pulmonary function testing in the interval prior to x-ray changes. In non-smokers it increases in severity when pleural abnormalities are apparent. In smokers FVC decreases when pleural changes become visible. The authors argue that the presence of pleural plaques and/or diffuse pleural thickening means that functionally important alterations have already occurred in the small airways just as with asbestosis.

Appendix A: Criteria for the diagnosis of asbestosis

An important issue with this disease is "What criteria constitute a diagnosis of asbestosis?" Hyers[3] points out at one extreme it includes:-

1. An exposure history;
2. Latency;
3. Interstitial changes (ILO 1/1 at least together with pleural changes);
4. Restrictive lung function changes;
5. Reduced diffusion capacity;
6. Crackles on auscultation.

As Hyers again notes "this constellation of details defines only a small sub-group with far advanced asbestosis and excludes the great majority of affected individuals with early or milder disease" .

Browne[6] puts forward the following criteria for the diagnosis of clinical asbestosis in a live subject. In general such a diagnosis requires:

I. An adequate history of exposure to asbestos.

II. Symptoms of effort dyspnoea together with appropriate abnormalities in at least two of the following ;

III. Abnormal physical signs (persistent bilateral basal late-inspiratory crackles of high to medium frequency which occur early in the evolution of the disease)

IV. Abnormalities of lung function (significant reduction in TLC, VC, FVC, TLCO., with or without slightly increased RV)

V. Radiographic abnormalities.

These two approaches are not entirely incompatible but indicate Browne's emphasis on clinical asbestosis as against Hyers view of the natural history of the disease.

Appendix B: Members of the National Asbestos Medical Panel

W. Glass MBChB, DIH, FFOM, FAFOM (Convenor)

R. Armstrong MBChB (Hons), FRCP, FRACP

D. Jones MBBS, MRCP (UK), FRACP

T. Christmas MD, FRACP

N. Pearce BSc, PhD (Epidemiology)

References

[1] *Report of the Asbestos Advisory Council to the Minister of Labour, April 1991.* Occupational Safety and Health Service, Department of Labour.

[2] Lanphear B. P, Buncher C.R. Latent period for malignant mesothelioma of occupational origin. *J O M*, *34*, pp 718-21.

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[4] Gilson JC Asbestosis. *Encyclopedia of Occupational Health and Safety,* 1983. 3rd edition, vol 1, pp 187-191.

[5] Kilburn K.H and Warshaw R.H. Pulmonary functional impairment associated with pleural asbestos disease. *Chest* 1990, **98**: pp 965-972.

[6] Browne K. *Asbestos-related Disorders, Occupational Lung Disorders.* W Raymond Parkes, 3rd edition, 1994 pp 438-439.