NATIONAL ASBESTOS REGISTERS

Annual Report 1996-97

OCCUPATIONAL SAFETY & HEALTH SERVICE

DEPARTMENT OF
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TE TARI MAHI

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SUMMARY

This report reviews notifications made to the National Asbestos Medical Panel for the period March 1992 - October 1997. A total of 554 cases were reviewed, which included:

- 96 cases of mesothelioma
- 47 cases of lung cancer
- 118 cases of asbestosis
- 293 cases of pleural abnormalities

Once again it is noted that the number of lung cancer cases is relatively small compared with mesothelioma cases. This suggests that lung cancer history taking is dominated by the smoking factor and occupation — whether that of the asbestos-exposed worker, the welder, or the timber treatment worker — is ignored.

The transfer of asbestos from the workplace to the home is another emerging feature of asbestos-related disease in New Zealand. Family members are presenting with pleural changes or, rarely and tragically, mesothelioma.

The first research paper to emerge from the registers was published in 1997. It asked the question:

> *Is exposure to asbestos dust in the New Zealand context an independent cause of respiratory symptoms (cough, phlegm, shortness of breath, and wheeze), taking into account other relevant factors such as age and smoking?*

The paper was based on 2,257 of the 13,000 self-referred individuals on the exposure register, a group that included carpenters and builders. Copies are available from the registrar.

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 FAFOM (Hon) FFOM(I) (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. Dr D Fishwick joined the panel in 1997. He was subsequently appointed to a position in the United Kingdom and is retained as a consultant to the panel.

The first meeting of the panel was held in February 1992.
Professor Glass was nominated as the panel's convenor.

The following members were appointed to the National Asbestos Radiological Panel:

Dr Paul White
Dr George Foote
*Dr Graeme Anderson

*Dr Anderson has since retired.

The Registrar from 1991 to 1996 was Mr Craig Eades. Since 1996 it has been Ms Nicola Holden.

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 the 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 the Notifiable Occupational Disease System, 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).

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:

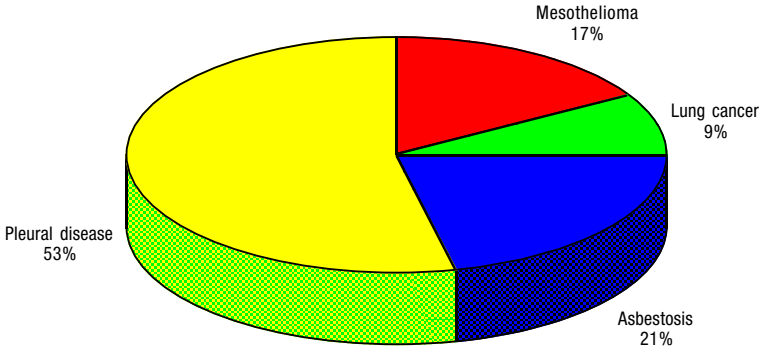
- Mesothelioma
- Lung cancer
- Asbestosis
- Pleural abnormalities (plaques, diffuse bilateral pleural thickening and effusions).
- Other cancers
- Obstructive lung disease without x-ray changes.

SUMMARY OF REGISTRATIONS

The following summary is based on the 554 cases reviewed over the period March 1992 to October 1997, and included 96 cases of mesothelioma, 47 cases of lung cancer, 118 cases of asbestosis, and 293 cases of pleural abnormalities.

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

Figure 1: Asbestos-related disease reviewed and confirmed by panel 1992-97

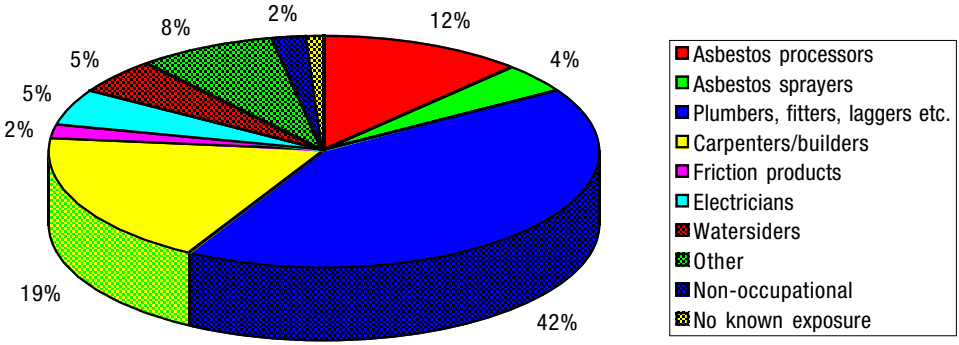


Occupation

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

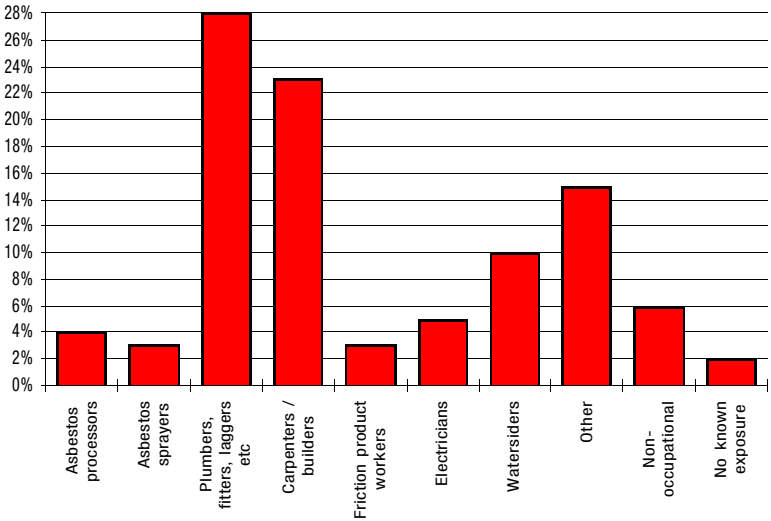


Mesothelioma

96 cases were reviewed, 92 being Caucasian, 3 Maori and 1 other. 87 males and 9 females. The mean age at diagnosis was 63 years (range 35-89). The mean years since first exposure was 42 (range 12-74). The mean exposure index was 147 (range 1 -780).

The occupational classification is shown in figure 3.

Figure 3: Occupations — mesothelioma



There were 9 current smokers, 52 ex-smokers and 24 non-smokers (information was not available for 11 cases).

The three categories: Asbestos processors, plumbers/fitters/laggers, and carpenters/ builders, comprised 55% of all registered cases.

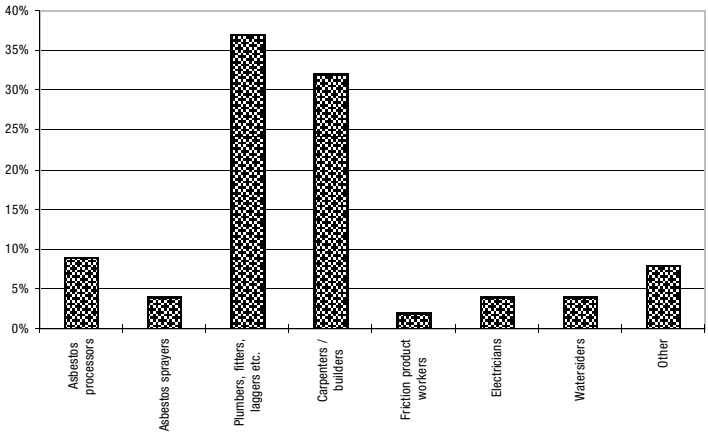
It has been noted[2] that an asbestos exposure history may be lacking with mesothelioma cases. Our experience suggests that with patience and a recognition of the range of likely exposures, it is often possible to obtain evidence of asbestos exposure. In one case the disease developed in a middle-aged 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

47 cases were reviewed, 43 being Caucasian, 2 Maori, 1 Pacific Islander, and 1 other. 45 were males, 2 females. The mean age at diagnosis was 64 (range 42-76), the mean years since first exposure was 39 (range 17-62). The mean exposure index was 163 (range 13-565).

Occupational classification is shown in figure 4.

Figure 4: Occupations — lung cancer



There were 11 current smokers, 33 ex-smokers, 1 non-smoker, and 2 unknown.

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

Histological classification revealed 24 squamous cell, 14 adeno, 4 oat cell, 2 undifferential, 1 bronchiolo-alveolar, 1 large cell, 1 not stated.

Tumour site was as follows: 22 upper lobe (12 squamous, 4 adeno, 3 oat, 1 large cell and 2 undifferentiated), 14 lower lobe (5 squamous, 8 adeno, 1 oat), 5 middle lobe (all squamous), and 6 not stated.

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".

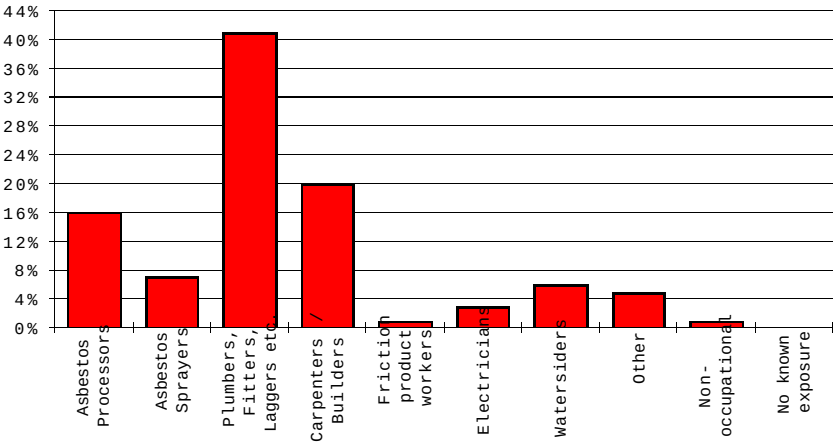
A number of issues of concern exist in recognising lung cancer as asbestos-related. Some authorities require the concurrent presence of asbestosis visible on radiography, while others require either radiological asbestosis or microscopic evidence of fibrosis. With the public health nature of this register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

Asbestosis

118 cases were reviewed, 117 were Caucasian and there was 1 Pacific Islander, 115 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 197 (range 10-720).

Occupational classifications are shown in figure 5.

Figure 5: Occupations — asbestosis



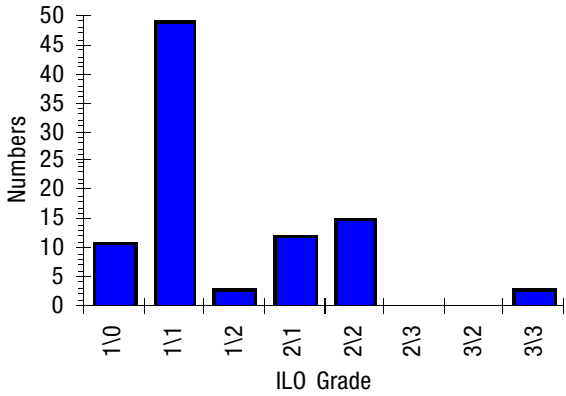
There were 13 current smokers, 80 ex-smokers and 21 non-smokers. (Accurate smoking histories were not available in 4 cases.)

Radiological changes showed 69 with pleural plaques, 14 with pleural thickening and 22 with both.

Of the 118 asbestosis cases, 93 were categorised by ILO classification, others were categorised on the basis of CT, HRCT or pathology where available.

The profusion score for the 93 cases so graded is shown in figure 6 below.

Figure 6: ILO grading of asbestosis cases (n=93)



An important issue with this disease is "What criteria constitute a diagnosis of asbestosis?". This issue is dealt with in some detail in appendix C. 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 118 asbestosis cases:

- All had a significant exposure history with a mean exposure index of 197 (range 10-720).
- 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.)
- 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 numbers in our report are small but confirm that the classical restrictive picture does not dominate, with obstructive, mixed, and normal patterns all occurring.

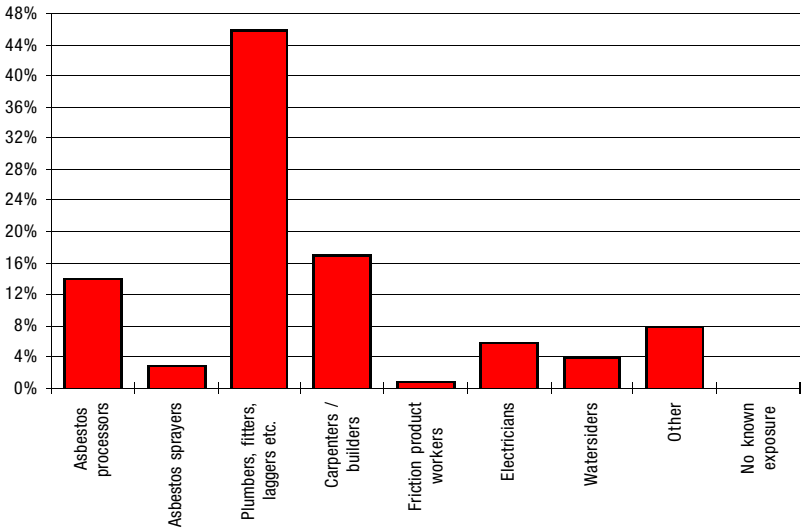
Pleural abnormality

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.

293 cases were reviewed. 282 were Caucasian, 6 Maori, and 5 Pacific Island. All but 1 were males. The mean exposure index was 176, with a range of 6 - 704. Occupational classifications are shown in figure 7.

There were 29 smokers, 176 ex-smokers and 79 non-smokers. (Accurate smoking histories were not available in 9 cases.)

Figure 7: Occupations — pleural abnormalities



References

1. *Report of the Asbestos Advisory Committee 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.

3. Hyers P.M, Ohar J. M, Crim C. Clinical controversies in asbestos-induced lung diseases. *Seminars in Diagnostic Pathology*, pp 97-101.

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

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

OSH publications on asbestos

1. *A Deadly Dust: 50 years of asbestos use in New Zealand.* Reprint from *Safeguard* magazine, December 1991.

2. *Safe Work on Asbestos-based Floor Coverings*. Leaflet, 1991.

3. *Audit of Floor Sanders and Work Practices Involving Asbestos-backed Vinyl Sheeting in the Christchurch Area.* Occasional Paper Series No. 4, 1992.

4. *Recent Advances in Asbestos-related Disease.* Dr Margaret Becklake, 1994.

5. *Asbestos Exposure and Disease: Notes for medical practitioners.* Booklet, 1995.

6. *Guidelines for the Management and Removal of Asbestos.* Booklet, 1995.

7. *The Epidemiology of Mesothelioma in Historical Context.* J.C. McDonald and A.D. McDonald (republished by permission of European Respiratory Foundation.

8. *Respiratory Symptoms and Asbestos Dust Exposure.* Occupational Health Report Series: No. 2, 1997.

Appendix A: Research arising from the registers

Respiratory symptoms and asbestos dust exposure.

Glass WI, Fishwick D, Eades C, Pearce NE, Armstrong RS and Jones D.

The question was raised, as a result of a review of cases of asbestos-related disease by the Medical Panel, as to whether asbestos dust was an independent cause of respiratory symptoms such as cough, phlegm, shortness of breath and wheeze.

An attempt to answer this question was made by reviewing 2257 workers on the Asbestos Exposure Register of 13,000 workers. Those 2257 workers were selected on the basis that they were a clearly defined occupational group of carpenters and builders essentially exposed to asbestos cement dust in the course of their work.

The analysis showed that after account was taken of other relevant factors such as age and smoking, there was no significant independent effect of cumulative lifetime exposure to asbestos on the presence of reported respiratory symptoms — such as cough, phlegm, wheeze and shortness of breath.

What was of interest, however, was the finding of a non-significant association with a questionnaire diagnosis of asthma and cumulative asbestos exposure and that, although the effect appeared small, the numbers within each exposure group were large and this may well have clinical significance.

Appendix B: Overseas visit/ Report by Dr Rob Armstrong

Dr Rob Armstrong, a respiratory physician member of the Medical Panel, paid a visit to the Wittenoom Asbestos Register at the Charles Gairdner Hospital, Perth.

Impressions

a. Research

The research output from this unit is impressive, and they are relatively well funded and staffed. They are currently very involved with ongoing longitudinal studies in mesothelioma, along with lung and other cancers. They are also involved in the vitamin A cancer prevention trials.

The Wittenoom cohort is clearly defined, and is a model (epidemiologically) for longitudinal research. Although the cohort is scattered throughout Australia, there is strong interest in the work being done by the unit, and there is no problem with compliance with further testing as needed.

Funding is available for serial x-ray, CT, lung function study, blood tests, and other costs.

The database has an extremely detailed history, particularly smoking and occupation, including accurate fibre estimates for the workers, although not for the residents of the Wittenoom area.

The overall impression was very much of a dynamic, academic and whole-time commitment to research from the Register.

b. Radiology

Dr Armstrong noted that:

i. ILO grading is still very relevant to asbestos research.

ii. Grading must be done in a blinded and double fashion.

iii. Categorisation of films over time, including pleural changes, is mandatory to allow accurate assessment of progress.

iv. Three-yearly serial x-rays is recommended for all persons on the Register.

c. Lung function

All persons on the register have full lung function tests, standard spirometry to ATS guidelines, diffusing capacity and static lung volumes.

Dr Armstrong concluded with the following recommendations:

1. The accurate grading of all films to the ILO standard set of Pneumoconiosis Radiographs still has a very important role in the assessment and categorisation of asbestos-related disease, despite the seemingly less severe changes seen currently when compared to the previously very heavily-exposed workers.

2. ILO readings should be undertaken to a protocol which includes paired readers using "blinded" films and "trigger" films included in each session to control for bias and intra-observer drift.

3. High-quality radiographs are essential to allow accurate assessment. Some films submitted for assessment are still substandard and may need to be repeated.

4. The role of CT in the assessment of asbestos-related pleuro-pulmonary disease has not yet been fully elucidated, but standard protocols have been generated (e.g. including prone films) and these must be followed by all centres undertaking CT scans for assessment of asbestos-related pathology.

5. Lung function data must be generated by laboratories and technicians trained to ATS standards and should include a flow-volume loop, static lung volumes and a diffusing capacity measurement. This will become increasingly important as more and more subtle pathology is noted.

6. Consideration may need to be given to funding further radiological or pulmonary function assessment if these are required by the panel and are not available from the clinical record.

Future directions

If a cohort of exposed persons can be identified, and fully assessed radiologically and physiologically, then serial studies over time will generate useful longitudinal data for study. The prerequisite for this to occur is the generation of an accurate database at the outset. The panel is in a unique position to follow longitudinally such a cohort in New Zealand, although funding may need to be sought.

Appendix C: 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 D: Members of the National Asbestos Medical Panel

W. Glass MBChB, DPH, DIH, FFOM, FAFOM, FAFOM(Hon.), FFOM(I) (Convenor)

R. Armstrong MBChB (Hons), FRCP, FRACP

D. Jones MBBS, MRCP (UK), FRACP

N. Pearce BSc, PhD (Epidemiology)

*D. Fishwick MD, MRCP

* Resigned, returned to United Kingdom, retained as a consultant.