

# NATIONAL ASBESTOS REGISTERS

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## SUMMARY

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This report reviews notifications made to the National Asbestos Medical Panel for the period March 1992 - July 1998. A total of 598 cases were reviewed, which included:

- 113 cases of mesothelioma
- 52 cases of lung cancer
- 139 cases of asbestosis
- 294 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.

Mesothelioma notifications continue to rise, reflecting exposure in the 1950s and 1960s, and this trend is likely to continue for some years to come.

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.

Finally, the Asbestos Regulations were rewritten during 1998, and will be published in 1999.

# BACKGROUND TO THE REGISTERS

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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<sup>1</sup> 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

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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

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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 (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. From 1996 to 1998 the position was held by Ms Nicola Holden, and later in the year by Ms Andrea Eng.

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 seven years since the register began it has raised the awareness of asbestos-related diseases among patients and 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 overall increase in the numbers of 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.

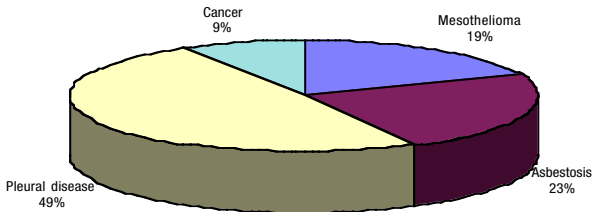
# SUMMARY OF REGISTRATIONS

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The following summary is based on the 598 cases reviewed over the period March 1992 to July 1998, and included 113 cases of mesothelioma, 52 cases of lung cancer, 139 cases of asbestosis, and 294 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 1992-98*

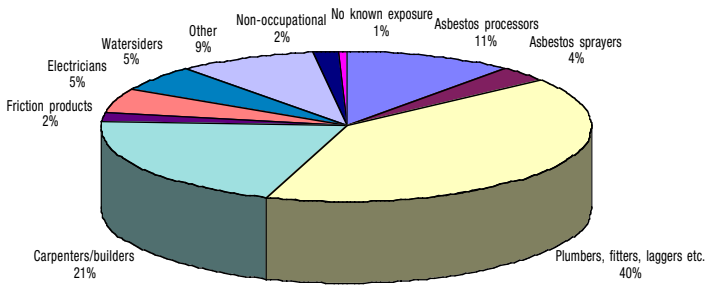


## ***Occupation***

Figure 2 looks at occupation for the four diagnostic categories discussed. It is clear that carpenters, plumbers and electricians, etc. are together responsible for almost 66% 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, such as children brought up in the home of an asbestos worker, and women who wash their husband's asbestos-contaminated clothes. The “no known exposure” category refers to mesothelioma cases where conclusive exposure histories have not been available.

Figure 2: Occupations — all disease categories

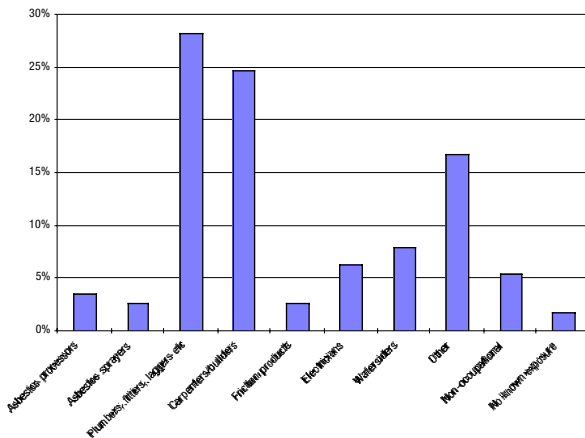


### Mesothelioma

113 cases were reviewed, 107 being Caucasian, 4 Maori and 2 other. 104 males and 9 females. The mean age at diagnosis was 63 years (range 35-89). The mean number of 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 12 current smokers, 59 ex-smokers and 31 non-smokers (information was not available for 12 cases).

The three categories: Asbestos processors, plumbers/fitters/laggers, and carpenters/builders, comprised 64% of all registered cases.

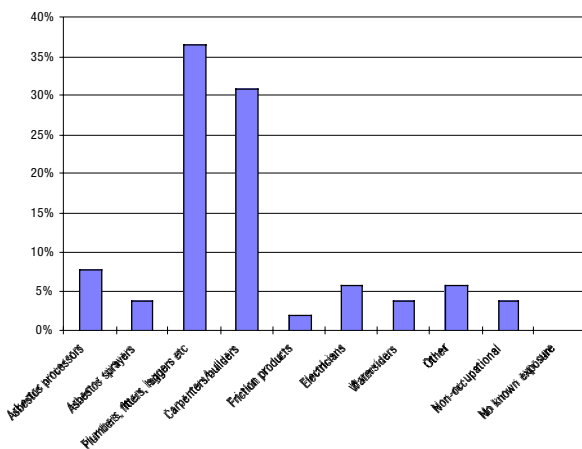
It has been noted<sup>2</sup> that an asbestos exposure history may be lacking with mesothelioma cases. Our experience suggests that with patience and a recognition of the range of likely exposures, it is often possible to obtain evidence of asbestos exposure. In one case the disease developed in a middle-aged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

52 cases were reviewed, 47 being Caucasian, 3 Maori, 1 Pacific Islander, and 1 other. 45 were males, 2 females. The mean age at diagnosis was 64 (range 42-77), the mean number of years since first exposure was 40 (range 17-62). The mean exposure index was 156 (range 12-565).

Occupational classification is shown in figure 4.

*Figure 4: Occupations — lung cancer*



There were 12 current smokers, 36 ex-smokers, 1 non-smoker, and 3 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 23 squamous cell, 16 adeno, 6 oat cell, 3 undifferentiated, 1 bronchiolar-alveolar, 2 large cell, 1 not stated.

Tumour site was as follows: 25 upper lobe (14 squamous, 5 adeno, 3 oat, 1 large cell and 2 undifferentiated), 16 lower lobe (6 squamous, 9 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<sup>3</sup>, 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".

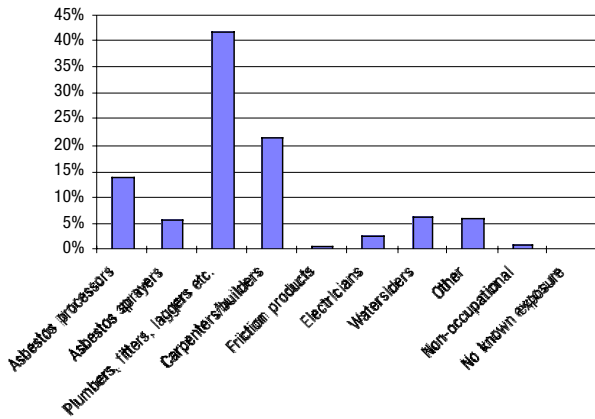
A number of issues of concern exist in recognising lung cancer as asbestos-related. Some authorities require the concurrent presence of asbestosis visible on radiography, while others require either radiological asbestosis or microscopic evidence of fibrosis. With the public health nature of this register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

## ***Asbestosis***

139 cases were reviewed, 137 were Caucasian and there was 1 Maori, and 1 Pacific Islander. Males numbered 136. The mean age at diagnosis was 66 (range 37-86), the mean number of years since first exposure was 39 (range 15-71). The mean exposure index was 190 (range 10-720).

Occupational classifications are shown in figure 5.

Figure 5: Occupations — asbestosis



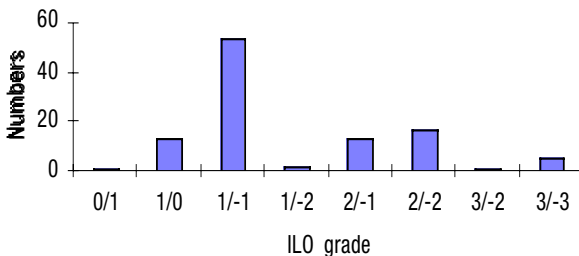
There were 14 current smokers, 95 ex-smokers and 26 non-smokers. (Accurate smoking histories were not available in 4 cases.)

Radiological changes showed 83 with pleural plaques, 12 with pleural thickening and 17 with both.

Of the 139 asbestosis cases, 105 were categorised by ILO classification, others were categorised on the basis of CT, HRCT or pathology where available.

The profusion score for the 105 cases so graded is shown in figure 6 below.

Figure 6: ILO grading of asbestosis cases (n=105)



An important issue with this disease is “What criteria constitute a diagnosis of asbestosis?”. This issue is dealt with in some detail in appendix B. 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<sup>4</sup> 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 139 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 except 1 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.

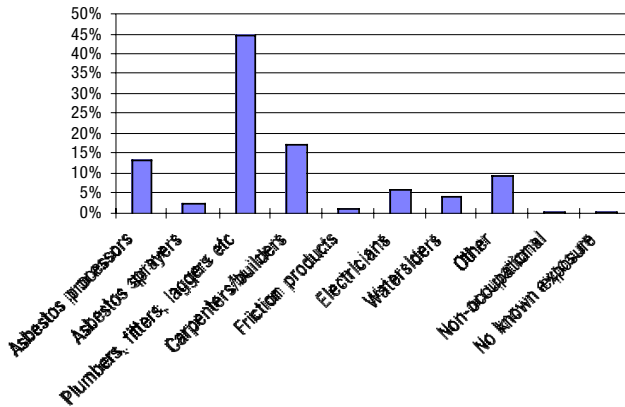
## ***Pleural abnormality***

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.

294 cases were reviewed. 285 were Caucasian, 5 Maori, and 4 Pacific Island. All but 2 were males. The mean exposure index was 177, with a range of 6 - 708. Occupational classifications are shown in figure 7.

There were 29 smokers, 179 ex-smokers and 78 non-smokers. (Accurate smoking histories were not available in 8 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.

## **Contact details**

1. National Asbestos Disease Register, c/- OSH, Department of Labour, PO Box 3705, Wellington

**Registrar:** Louisa Thomas, ph (04) 915 4466, fax: 915 4370

2. Asbestos Diseases Association of NZ (Inc.) P O Box 20-035, Glen Eden, Auckland 7

**Welfare and Investigating Officer:** A H Grootegoed, ph (09) 827 4912

Secretary: Lois J Syret, ph (09) 827 4912

## ***Appendix A: Publications***

1. **McDonald AD and McDonald JC.** *The Epidemiology of Mesothelioma in Historical Context*, Department of Labour, Wellington 1998.

In January 1998 the Asbestos Medical Panel sponsored a public address by Emeritus Professor Corbett McDonald. Professor McDonald and his wife — also Emeritus Professor — were on a private visit to New Zealand and graciously agreed to the lecture.

It was a fascinating personal account of asbestos research over more than half a century, with special reference to mesothelioma. With permission, OSH has republished “The Epidemiology of Mesothelioma in Historical Context” from the *European Respiratory Journal*. Copies are available from the Registrar of the Asbestos Diseases Panels.

2. **Burdorf A, Swaste P.** An Expert System for the Evaluation of Historical Asbestos Exposure as Diagnostic Criterion in Asbestos-related Disease. *Annals Occup. Hyg.* 43, 1, 57-66.

This paper attempts to develop an exposure-risk matrix, and has particular relevance to the Asbestos Registers medical panel. Of importance is the introductory section of the paper — when discussing asbestosis, the point is emphasised as to the linear relationship between the development of asbestosis and cumulative asbestos exposure. What is of interest is the evidence presented which suggests that cumulative exposure levels below 5 fibres/cm<sup>3</sup>/year put workers at risk, and that even at the OSHA standard of 0.1 fibres cm<sup>3</sup> the lifetime risk for workers exposed for 45 years is around 2 in 1,000.

When considering mesothelioma, the point is made that cases can occur with low asbestos exposure and a history of a brief exposure is sufficient to attribute a particular case to previous exposure. It is further shown that the mesothelioma risk is more determined by time-related aspects of asbestos exposure (i.e. age at first exposure, time since first exposure) than, for example, concentration.

Finally, when considering lung cancer, it is reaffirmed that the clinical signs of an asbestos-related cancer do not differ from a lung cancer due to other causes. There is, like asbestos, a linear exposure-response relationship as a function of cumulative exposure to asbestos in fibres/cm<sup>3</sup>/year.

## ***Appendix B: Criteria for the diagnosis of asbestosis***

An important issue with this disease is “What criteria constitute a diagnosis of asbestosis?” Hyers<sup>3</sup> points out that 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<sup>6</sup> 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 C: 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.