

## Malignant mesothelioma in Pilbara Aborigines

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**Abstract:** Malignant mesothelioma occurred in a female Aborigine after environmental exposure to asbestos. All known cases of the disease in Aborigines in Western Australia were reviewed; all occurred in Pilbara residents. Most were exposed while involved in the transport of asbestos from the Wittenoom crocidolite operation. Based on recent estimates of the size of the Aboriginal population in the Pilbara region, their incidence of this disease (250 per million for ages 15 and over) is one of the highest population-based rates recorded. (*Aust J Public Health* 1995; 19: 520-2)

Australian Aborigines and Torres Strait Islanders are currently the least healthy identifiable sub-population in Australia.<sup>1</sup> For all major disease categories, death rates for Aborigines are much higher than for other Australians, and life expectancy is about 20 years less. Although the biggest differences occur in circulatory diseases, infectious diseases, and injuries, neoplasms still rank as the fourth most common cause of death.<sup>1</sup> The causes of these neoplasms are likely to be external factors such as smoking. A notification to the Mesothelioma Register of Western Australia has highlighted a problem that is likely to increase.

### Case report

A 55-year-old Aboriginal woman was referred for investigation after she presented to the Aboriginal Medical Service in Roebourne with a two-month history of cough, increasing breathlessness and progressive left sided chest pain. She had physical signs of a left pleural effusion, which was confirmed with a chest X-ray. She was given antibiotic treatment but the effusion increased over six weeks. She had a history of obesity, non-insulin-dependent diabetes mellitus, hypertension, and an iron deficiency anaemia, for which she was receiving oral hypoglycaemic and iron therapy.

Physical examination and plain chest X-ray confirmed that she had a large left pleural effusion. She had a blood haemoglobin level of 13.6 g/dL, white cell count  $8.9 \times 10^9/L$  and an electrolyte sedimentation rate of 23 mm/hour. Plasma creatinine, urea

and electrolytes were normal, but liver function tests showed an elevated level of alkaline phosphatase (156 IU/L). Her random blood glucose level was 10.8 mmol/L and glycated haemoglobin was 9.4 per cent, suggesting poor diabetic control. Aspirated pleural fluid was lightly blood-stained, with a protein content of 4.5 mg/L and malignant mesothelial cells which contained glycogen but no epithelial mucin (periodic acid-Schiff positivity removed by diastase) and which were negative to the carcinoembryonic antigen immunoperoxidase reaction. Pleuroscopy revealed multiple white nodules 2 to 3 mm in diameter on both visceral and parietal pleural surfaces. Biopsy of these nodules showed infiltrating malignant pleural mesothelioma of epithelial type. She was discharged from hospital with no specific therapy and died early in 1995.

### Environmental history

The woman had been born in a mission about 100 km from Port Hedland. When she was a child, her family moved around the Pilbara where her father worked as a stockman. From the age of 16 she lived with her grandmother for about three years at a mission near Wittenoom and was then a cook at a nearby station, where she lived in open camps and tin sheds about 50 km from the homestead. During her time at the station she visited Wittenoom about once a fortnight for supplies, sometimes attending the races and sleeping overnight. During this period she may also have been exposed to crocidolite at Yampire Gorge (near Wittenoom), which she recalled visiting occasionally. She then spent about five years living in the Onslow area in open-air camps, and for the next 15 years she lived in the Pilbara region and worked intermittently as a cook on sheep and cattle stations. After that, she lived about 20 kms outside Wittenoom, visiting the town periodically to buy stores.

### Discussion

This Aboriginal woman, who developed malignant pleural mesothelioma, had only occasional and transient nonoccupational exposure to asbestos during a long period while living in the Pilbara region nearby

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to where both chrysotile (white asbestos) and crocidolite (blue asbestos) were mined. Her first exposure to both forms occurred about 38 years ago.

The records of the Occupational Respiratory Epidemiology group and the Western Australian Mesothelioma Registry contain information on 11 other Aborigines who contracted mesothelioma after 1975 in Western Australia (Table 1). All 12 Aborigines lived in the Pilbara region of Western Australia, but this was the first Aboriginal female to develop the disease. Eight of these people are known to have worked with crocidolite at Wittenoom or Point Samson in the past, and one was a child living near Point Samson where Wittenoom asbestos was loaded on to state ships for transport to Perth. He had played in the storage sheds on the wharves as a child of 10 or 11 years of age. The other two had lived at Wittenoom or nearby but had no documented occupational exposure to asbestos.

Mesothelioma due to nonoccupational exposure to mineral fibres has been well established for many years and has been reviewed elsewhere.<sup>2</sup> The disease has been reported among people exposed through naturally occurring sources of asbestiform minerals, through household contact with asbestos workers and through proximity to asbestos mines or production plants.

Crocidolite has probably caused more mesothelioma than any other of the commercially available forms of asbestos; workers who have been exposed to crocidolite have the highest rates of any occupationally exposed groups.<sup>3</sup> A follow-up study of nearly 5000 people who had lived at Wittenoom but had never worked for the mining company, Australian Blue Asbestos, found 24 cases of mesothelioma to the end of 1992.<sup>4</sup>

The practice of transporting the asbestos from Wittenoom in hessian bags was the cause of at least 8 of the 12 cases reported here and was carried out throughout the life of the mine. Such practices were explicitly banned in asbestos-processing factories by the British Asbestos Regulations of 1931, and strongly criticised again in the Chief Inspector of Factories Report for 1949.<sup>5</sup>

Previous studies of workers at Wittenoom showed that the risk of mesothelioma following crocidolite exposure is dose-dependent and increases exponentially with time from first exposure, indicating that many more cases will continue to occur.<sup>6</sup> It has also been predicted that at least 250 cases of mesothelioma among former Wittenoom workers,<sup>7</sup> or 366 further cases among workers and former residents combined could still arise,<sup>8</sup> even though the median duration of exposure to crocidolite in the workforce of nearly 7000 people was only four months and the median cumulative exposure only 6 fibres per ml-years.<sup>9</sup> The number of Aboriginal people inhabiting the region of Wittenoom and Point Samson over the years, who may have had similar exposures to the reported patient or to former workers or residents has never been documented and the possibility of continuing exposure still exists. The size of the population that received transient exposure during periods of casual employment in the industry is also unknown, as employment records for Aborigines were never made. It is therefore impossible to pre-

Table 1: Aborigines known to the Western Australian Mesothelioma Registry, 1961 to 1994

Diagnosis			Year	Year	Exposure Type	Place
Age	Sex	Year				
61	M	1975	~ 1955	Lumping	Roebourne, Pt Samson	
48	M	1980	~ 1955	Trucking	Wittenoom, Pt Samson	
54	M	1980	~ 1956	Trucking	Wittenoom, Pt Samson	
45	M	1985	1958	Trucking	Wittenoom	
50	M	1986	~ 1940	Father was crocidolite prospector	Wittenoom	
75	M	1987	1965	Pipe-laying	Wittenoom	
79	M	1989	~ 1955	None specific	Wittenoom, Roebourne	
52	M	1990	1960	Lumping	Pt Samson	
40	M	1992	1962	Playing in storage sheds	Pt Samson	
55	M	1993	~ 1957	Lumping	Pt Samson	
55	F	1993	~ 1957	Regular visits to Wittenoom	Wittenoom	
58	M	1994	~ 1957	Lumping	Pt Samson	

dict what future incidence of mesothelioma may occur in the people of this region.

The total population of Aborigines in Western Australia is about 40 000, of whom about 6000 live in the Pilbara region where all those affected lived at the time of their exposure. Over the last six years, therefore, the crude incidence rate of malignant mesothelioma has been about 250 per million person-years for those aged 15 and over, 5 to 10 times higher than any of the other population-based rates,<sup>3</sup> apart from the extremely high rate due to exposure to erionite in Karain, Turkey.<sup>10</sup> Unfortunately, it is probable that the risk of mesothelioma resulting from past exposures will continue to increase with time. Studies to establish the likely extent of the problem appear indicated. These should include registration of people thought likely to have been exposed, fibre-counting of any available lung tissue specimens, and estimation, possibly through simulation, of likely airborne exposure levels in and around Wittenoom and Point Samson over the years.

#### Addendum

A further case of malignant mesothelioma in a 60-year-old Aboriginal man in Western Australia was confirmed by needle biopsy in early 1995. He had worked on a sheep station near Wittenoom and visited the Wittenoom mine workshop for repairs to station machinery for a few hours on about 40 to 50 occasions, staying in the town overnight a few times. He had also been a bulldozer driver in open-cut tin, gold, manganese and tantalite mines in the area. Plain chest X-ray showed a mass at the right lung base, extending into the chest wall and the posterior mediastinum. He developed progressive compression of his oesophagus and inferior vena cava and died 14 weeks later.

### Acknowledgments

The assistance of Dr Tim Threlfall and other members of the Mesothelioma Registry Committee of the Health Department of Western Australia is gratefully acknowledged. This study was partly funded by the Australian National Health and Medical Research Council and the Public Health Research and Development Committee.

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## Australian dietary targets in 1995: their feasibility and pertinence to dietary goals for 2000

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**Abstract:** To ascertain whether the diet of young students in health-related courses conformed to Australian dietary targets for 1995 and to identify nutritional needs in view of dietary targets for 2000, 246 undergraduate students analysed their weighed diet for three or five days. Eight of ten male participants were meeting the dietary goals for 1995 for fibre and fat intake and six of ten were meeting the goals for 2000. More female participants were meeting the goals for fat, but less than half of the females were meeting the 1995 goals for fibre. Some 84 per cent of females, but only 29 per cent of males, were meeting the 1995 dietary goals for sodium. Few participants derived 10 per cent or less of their energy from saturated fat or 10 per cent of their energy from polyunsaturated fatty acids. Substantial numbers of participants failed to meet the recommended daily intakes of zinc, calcium, magnesium and iron (females). Education of specific subgroups and modifications to food production and processing are proposed. (*Aust J Public Health* 1995; 19: 522-4)

In 1987, the Australian Department of Health published nutrition targets for improving the health of Australians.<sup>1</sup> The dietary goals for Australia include a reduced consumption of fat, sodium, alcohol and refined sugar and an increased intake of fibre. The taskforce believed that such targets were realistic, and the short-term viability of such a program has been confirmed.<sup>2</sup> Despite deliberations about implementing these guidelines,<sup>3</sup> the adequacy of food choices alone to achieve a substantive change in Australian dietary health has been ques-

tioned.<sup>4</sup> Production, processing and distribution, and nutrition along with consumption, all deserve attention in the endeavour to enhance healthy diets.<sup>6</sup> Although a population-based strategy introducing health promoting modifications in food production and processing may achieve a more pervasive outcome than consumer education, an educational approach is consistent with the ethos of self-determination in health care.

This paper reports on how well a convenience sample of 'informed' participants conformed to the 1995 dietary goals of the Australian health care system, identifies sex differences in the dietary habits of participants and recognises the potential for precipitating an untoward dietary imbalance by adherence to dietary goals.

### Methods

Analysis of the diets of 126 males and 120 females between the ages of 18 and 35 with an interest in health matters was undertaken in the 10 months before 1995, the due date for the first Australian dietary target. During 1994, students undertaking bachelor-level courses with a health orientation were required to perform, for three to five days, a 'weighed personal dietary analysis' as part of their undergraduate nutrition course. All food and drink consumed during the study period was weighed using a digital scale. Data were analysed using the Diet/3 nutrient-analysis Xyris software. This system is based upon the 1992 NUTTAB database and pro-

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