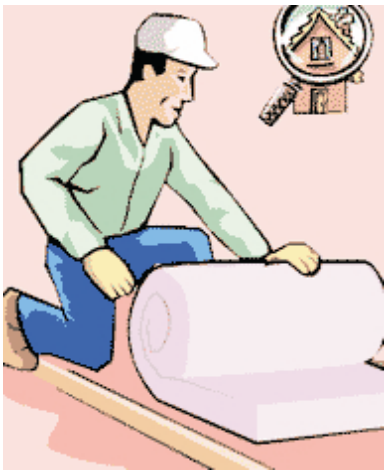
Asbestos



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INTRODUCTION

Asbestos is the term used to describe a group of naturally occurring minerals whose characteristic feature is that they occur as fibres. The most common types used in Australia have been:

- chrysotile (white asbestos)
- amosite (brown asbestos)
- crocidolite (blue asbestos)

Chrysotile has been the most widely used in Australia, comprising well over 50% of all asbestos used. Other forms of asbestos, namely anthophyllite, tremolite and actinolite are encountered rarely, if ever, in Australia.

The fibres of asbestos can be split by mechanical energy into progressively finer fibres and eventually into fibrils of microscopic size. Respirable fibres longer than about 5 μm are considered responsible for adverse health effects caused by asbestos. To be respirable, a fibre needs to have a diameter of less than about 5 μm, though those of diameter less than about 1μm are considered most hazardous.

USES

Over 3,000 uses of asbestos have been described. Among the most common have been:

- asbestos-cement building products eg. "fibro" boards, pipes and roofing materials
- electrical, thermal and acoustic insulation eg. lagging, asbestos rope and asbestos cloth
- fire resistant insulation eg. sprayed "limpet" asbestos in buildings

HEALTH EFFECTS

Three diseases are related clearly to asbestos exposure.

1. **Asbestosis** which is a non-malignant, diffuse fibrosis (scarring) of the lung tissue. It is invariably of occupational origin, usually following many years of exposure. In some cases, short-term exposure (months) to very high airborne fibre levels has been responsible. Low-level environmental exposure would not be expected to cause asbestosis, as the minimum threshold of exposure required for clinical disease would not be likely to be exceeded.
2. **Lung cancer** has been associated with all forms of asbestos. It typically presents 10 - 30 years or longer after the onset of exposure. It appears to occur only following levels of exposure associated with asbestosis and thus, it would seem to be related to occupational exposure to asbestos. The risk of lung cancer is increased greatly in asbestos workers who smoke.

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3. **Mesothelioma** is a highly malignant tumour of the tissue membrane which lines the internal organs. When it occurs around the lungs, it is termed pleural mesothelioma. Such tumours in the abdomen are termed peritoneal mesotheliomas. The majority of cases occur following occupational exposure to asbestos, particularly to crocidolite. It is a rare disease in the non-occupationally exposed general population. The Australian Mesothelioma Surveillance Program showed that almost 30% of cases occur in persons with no apparent history of occupational or significant environmental exposure. Smoking has no apparent effect on the risk of this disease.

Another pathological feature of asbestos exposure is the presence of pleural plaques or pleural thickening in the membrane lining the lungs. These can be detected by chest X-ray. They are rarely of any clinical significance and they do not become malignant. However, they indicate significant previous exposure to asbestos and thus, the risk of malignancy in a person who displays pleural plaques is increased. This history of heavy asbestos exposure should be self-evident to the person and could be ascertained by conducting an occupational history.

OCCUPATIONAL EXPOSURE

Asbestos-related disease is typically subsequent to occupational exposure, which may have occurred in a diverse range of industries. There is usually a long latency period between first exposure and onset of disease. This period can be well over 40 years in the case of mesothelioma. Thus, the disease diagnosed in the 1990s typically reflects exposure which occurred many years ago and often before the mid-1960s.

It is recognised generally that occupational exposure has been more effectively controlled during the last two decades than was the case previously. Also, occupational exposure standards for asbestos are now more stringent than in the past. It is considered that the current occupational exposure standards effectively control the risk of disease from occupational exposure. Worksafe Australia (the National Occupational Health and Safety Commission) has adopted the following exposure standards for **occupational** exposure:

- chrysotile 1.0 fibres/mL of air
- crocidolite 0.1 fibres/mL of air
- amosite 0.1 fibres/mL of air

ENVIRONMENTAL EXPOSURE

Typical environmental exposure to asbestos is very low and orders of magnitude below recommended occupational exposure standards. Exceptions have occurred where communities lived near asbestos mines or mills Eg. Wittenoom in Western Australia, or in the case of residents near some asbestos factories which were producing point-source environmental pollution.

Typical long-term population exposure has been estimated to be about 0.0005 fibres per mL in schools, public buildings and out of doors. Often, the airborne level will be below the limit of detection in such situations. Based on the extrapolation of the dose-response relationship following occupational exposure, it has been estimated that life-time exposure to this level would represent less than a 1 in 100,000 life-time cancer risk. In deriving this risk, it has been noted that the true risk may be even lower, if not nil, if the dose-response relationship at very low exposure levels is not linear, or if there is a threshold.

The major environmental exposures which cause community concern are:

- exposure from asbestos-cement building products in homes, schools and other buildings
- asbestos fibre in drinking water eg. rain water collected from an asbestos-cement roof

Asbestos-cement building products contained up to about 5-15% asbestos. Older products contained higher percentages than products produced more recently. Since the mid-1980s, these products have been produced in Australia without any asbestos content. Thus, if the material is thought to be older than the early-1980s, it is reasonable to assume that it contains asbestos and laboratory testing is not indicated usually.

The asbestos in these products is tightly bound due to the cementitious nature of the material and also because the products are compressed during manufacture. Typically, the content of fibres in the respirable size range is low. The spontaneous generation of airborne hazardous fibres has been shown in many studies to be very low. However, during activities such as power sawing, sanding and drilling, the release of respirable fibres will occur and precautions should be taken at such times.

In buildings comprised of these products, various studies have shown air levels usually below 0.0005 fibres/mL, if measurable at all. Also, the greatest proportion offibres in buildings is usually chrysotile, whereas crocidolite, which is regarded as the most hazardous form, is usually present in far lower amounts. Occupation of buildings where the airborne fibre levels are of this concentration poses no risk of asbestosis and a negligible risk of lung cancer and mesothelioma. It is considered that such products can remain safely *in situ*, but appropriate precautions should be taken to control dust exposure during renovations.

Drinking water often has been transported in high pressure asbestos-cement pipes or collected into household tanks from asbestos-cement roofing material. The risk posed by the long-term consumption of such water has been studied extensively. Data from both animal experimentation and human epidemiological studies have shown that the risk of asbestos-related disease is not increased. Also, studies show that ingested asbestos fibres very rarely penetrate the gastro-intestinal mucosa. Taking into account all of this information, it would appear that the carcinogenic effect of drinking water contaminated by asbestos is very small, if not zero.

SAFETY PRECAUTIONS

In situations of occupational exposure to asbestos, compliance with the provisions of the *Workplace Health and Safety Act 1995* and subordinate Regulations is required. The advice of Workplace Health and Safety, Department of Training and Industrial Relations should be sought.

For non-occupational situations where activities might cause the release of asbestos fibres from asbestos products, the following principles should be adopted:

- use methods which minimise dust generation eg. hand-powered tools, control dust generation by wetting the asbestos product, avoid unnecessary breakage of asbestos-cement products
- wear respiratory protection suitable for asbestos dust eg. Toxic dust respirator
- collect all debris into a plastic bag and seal it before disposing by burial at your local authority's refuse tip
- shower thoroughly and wash work clothing after completing the work
- keep people who need not be present away from the work area

SELECTED BIOGRAPHY

Commins BT. Asbestos fibres in drinking water. Scientific and Technical Report 1. Commins Associates, Pippins, Altwood Close, Maidenhead, Berkshire, SL6 4PP, England, 1983.

Commins BT. The significance of asbestos and other mineral fibres in environmental ambient air. Scientific and Technical Report 2. Commins Associates, Pippins, Altwood Close, Maidenhead, Berkshire, SL6 4PP, England, 1985.

Davis JMG, McDonald JC. Low level exposure to asbestos: is there a cancer risk? Br J Ind Med 1988; 45:505-508.

Ferguson D. Low-level asbestos - the priorities are wrong. Med J Aust 1990; 152:617-618.

Ferguson DA, Berry G, Jelihovsky T, Andreas SB, Rogers AJ, Chung Fung S, Grimwood A and Thompson R. The Australian Mesothelioma Surveillance Program 1979-1985. Med J Aust 1987; 147:166-171.

Lee RJ, Van Orden DR, Corn M and Crump KS. Exposure to airborne asbestos in buildings. Regul Toxicol Pharmacol 1992; 16:93-107.

National Occupational Health and Safety Commission. Asbestos: Guide to the control of asbestos hazards in buildings and structures; Code of practice for the safe removal of asbestos; Guidance note on the membrane filter method for estimating airborne asbestos dust. August 1988. Australian Government Publishing Service, Canberra..

National Occupational Health and Safety Commission. Exposure Standards for Atmospheric Contaminants in the Occupational Environment. Australian Government Publishing Service, Canberra, May 1995.

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