



*"When you can't breathe...  
nothing else matters"*<sup>TM</sup>

## **Outdoor Air Pollution & Lung Disease**

### What is air pollution?

Modern industrial society produces a large number of gases and particles which can pollute outdoor air. In the past, one of the major sources has been the burning of coal in power stations, other industries and homes. European coal has quite a high sulphur content, so it produces a lot of sulphur dioxide and fine particles (smoke) when burnt. Fortunately Australian coal and oil has a much lower sulphur content and this sort of pollution has never been a major problem in our capital cities.

Nowadays the main problem is motor vehicle exhaust. Petrol engines produce oxides of nitrogen and unburnt volatile organic compounds. Under the influence of sunlight, these substances combine with oxygen in the air to produce ozone, the main gas in smog. This ozone near the ground should not be confused with the ozone layer high in the atmosphere which protects us from harmful ultraviolet rays. Another gas, nitrogen dioxide, is responsible for the brown colour of smog. Many Australian cities experience smoggy days during the summer.

Fine particles in the air cause the hazy winter days seen in our cities. These particles come from a wide variety of sources including petrol and diesel exhaust, road dust, smoke and fly ash from industry, wind blown topsoil, backyard incinerators, bushfires, pollens from grasses and other plants, etc. The particles of greatest concern are those which are small enough to be breathed into the lungs.

### Can air pollution harm people?

There is no question that the old style of air pollution could kill people. In one week following the infamous 'peasouper' fog in December 1952, 4,700 people died in London. Most of these people were elderly and already had heart or lung diseases. A series of these killer fogs eventually led to the British Parliament passing the Clean Air Act which restricted the burning of coal.

Fortunately the effect of smog on the lungs is not so dramatic. Scientists have now conducted a number of laboratory experiments in which volunteers are exposed to ozone inside a steel chamber for a few hours. Even at quite low concentrations there is a reversible fall in lung function, an increase in the irritability of the lungs and evidence of airway inflammation. Although irritable and inflamed lungs are particularly seen in people with asthma and other lung diseases, these effects of ozone also occur in healthy subjects.

Similar changes are also seen after exposure to nitrogen dioxide, although there is some disagreement about the concentration at which they occur.

Other studies have found that people living in areas with high levels of pollution have more symptoms and worse lung function than those living in areas with clean air. Groups of children attending school camps show falls in lung function even at quite low concentrations of ozone. There is also a relationship between ozone levels and hospital admissions for asthma, both in North America and Australia. It is suspected that long-term exposure to smog may result in chronic bronchitis and emphysema, but this has yet to be proven.

Recently an association has been found between the levels of particles in the air and death rates in North American cities. The reason for this association is not understood and as yet there is no evidence this occurs in Australia. However, we do know that hazy days are associated with more asthma attacks in children.

### Can air pollution cause asthma?

Smog and particles certainly trigger attacks in some people who already have asthma. For a long time it was thought that air pollution could not cause asthma to develop in previously healthy people. Some recent experiments challenge this belief.

Scientists have shown that people exposed to ozone or nitrogen dioxide are more likely to react to allergens such as grass pollens and housedust mites than those who are not exposed. Thus a combination of air pollution and allergens could cause some cases of asthma. Across the board, other factors including allergens, colds, cigarette smoking and exposure to fumes and dust at work are probably more important.

### Can air pollution cause cancer?

Lung cancer is more common in cities than in the country. We know that over 90% of lung cancers are caused by smoking cigarettes. A radioactive gas called radon is thought to cause about 7% of lung cancers in North America. Fortunately the radon levels in Australian homes are quite low. Certain chemicals found in diesel exhaust and in emissions from heavy industry can also cause lung cancer. Although these chemicals have been detected in outdoor air, both in Sydney and Melbourne, the levels are too low to cause many cases of lung cancer.

### What about animals and plants?

One of the most alarming things during the London fog in 1952 was that prize animals at the Smithfield Show developed respiratory distress and died. A considerable number of laboratory experiments since then have confirmed that certain animals are particularly susceptible to air pollution. This work has also taught us how pollutants damage the lung.

Some of the guidelines to control pollution have been based upon the effect on vegetation. Ozone damages forests and reduces crop yields. It is also possible that some trees and grasses produce more irritating pollens when stressed by pollution.

This brochure is one in a series produced by Lung Foundation Australia to provide information on lung disease, its treatment and related issues. The information published by Lung Foundation Australia is designed to be used as a guide only, is not intended or implied to be a substitute for professional medical treatment and is presented for the sole purpose of disseminating information to reduce lung disease.

Any information relating to medication brand names is correct at the time of printing. Lung Foundation Australia has no control or responsibility for the availability of medications, which may occasionally be discontinued or withdrawn.

Please consult your family doctor or specialist respiratory physician if you have further questions relating to the information contained in this leaflet. For details of patient support groups in Australia please call 1800 654 301.

### What can patients and doctors do about air pollution?

The Environment Protection Authorities in most States can predict when high levels of pollution will occur, and announce smog alerts. A summary of air pollution levels is sometimes presented in the news. Patients with asthma or other chronic lung diseases should notice whether they have more symptoms, worse lung function, or need more reliever medication on these days. If this does occur, they should stay indoors if possible.

If they have to go outdoors, they should avoid strenuous exercise. If problems still occur, they should ask their doctors to prescribe preventive medication. A more drastic solution is to move away from the traffic and out of the city. However, air pollution can travel considerable distances, and there may be other problems in the country such as high levels of grass pollen. The single most important thing to prevent lung cancer and many others cancers is not to smoke.

### What can the community do about air pollution?

Acceptable and detrimental levels of air pollution are specified in legislation. Unfortunately these levels are often based on outdated scientific information. A change in the acceptable level of ozone and the introduction of a new level for particles was recommended in 1990. This has still not happened, largely because of lobbying by industries with vested interests.

Only community pressure will encourage politicians to act.

Actually reducing the levels of air pollution in Australian cities will be difficult. Emissions from industry are reasonably well controlled, although this could change with deregulation. Because motor vehicles are the major culprits, it will be necessary to make some hard decisions about restricting their use. Inner city living should be encouraged to slow the continuing growth of our cities and associated road building. Public transport will need to be developed. New rules limiting diesel exhaust should help. Ultimately only a non-polluting renewable source of energy will solve the problem of air pollution.

### More information about air pollution and your health

NSW Department of Health publications factsheets:

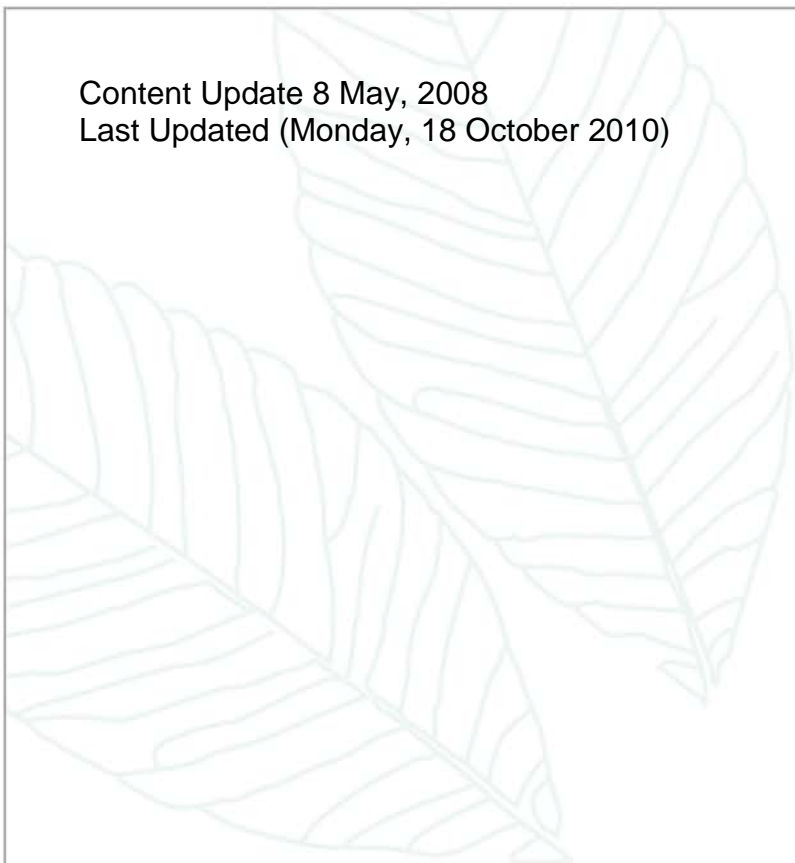
- Bushfire smoke [PDF 61Kb]
- Wood smoke from wood-fired home heaters [PDF 61Kb]
- Unflued gas heaters [PDF 50Kb]
- Car and home smoke free zone [PDF 691Kb]
- The air toxics national environment protection measure
- Dust storms [PDF 46Kb]
- other
- Air Pollution Health Alerts - What They Mean To You [PDF 57Kb]
- Air Pollution Health Alerts - Information for Health Professionals [PDF 75Kb]
- Comparison of personal exposure to air pollutants by commuting mode in Sydney [PDF 361Kb]
- National Asthma Council Australia
- Ambient Air Quality (Environment Protection and Heritage Council)

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