

# Mine dust lung disease

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**WORKER INFORMATION BOOKLET**

**November 2020**



**Resources Safety & Health**  
Queensland

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## **Protecting Queensland's mine and quarry workers**

Mine dust lung disease (MDLD) is the term used to describe the group of lung diseases that can result from long-term occupational exposure to respirable dust. These include forms of pneumoconiosis, such as coal workers' pneumoconiosis (CWP) and silicosis, and chronic obstructive pulmonary disease.

Mine dust lung disease may take several years to develop, commonly 10 years or more. However, in some instances, early signs of disease appear after less than 10 years.

The risk of developing disease might be higher if you are sensitive to the effects of dust or are a smoker.

Mine and quarry workers may also develop other lung diseases, including cancer, by breathing in harmful fumes or particulates, for example diesel exhaust or welding fumes.

## About this booklet

This booklet provides information to Queensland mine and quarry workers about the types of mine dust lung diseases and how they affect your lungs. An awareness of mine dust lung disease, along with regular respiratory health surveillance and control measures to reduce exposure to respiratory hazards, are critical in protecting the health of mine and quarry workers.

This booklet should be read alongside the following Resources Safety & Health Queensland (RSHQ) companion booklets:

- *Airborne dust exposure in mines and quarries* – information about controls to protect from dust exposure.
- *Respiratory health surveillance for mineral mine and quarry workers* – explanation of the respiratory health surveillance process for mineral mine and quarry workers.
- *Health assessment information for coal mine workers* – explanation of the health assessment process under the Coal Mine Workers' Health Scheme.

**The most important thing is prevention. Preventing mine dust lung disease is among the highest priorities in protecting the health of mine and quarry workers. It is an effort that requires your commitment and the site operator's commitment.**

## What is mine dust lung disease?

Mine dust lung diseases include:

- pneumoconiosis (pronounced ‘NEW-mo-co-nee-O-sis’)
- chronic obstructive pulmonary disease (COPD), which includes:
  - chronic bronchitis
  - emphysema
- diffuse dust-related fibrosis (DDF)
- asbestosis and asbestos pleural disease
- lung cancer.

A worker with mine dust lung disease may often have more than one of these diseases. For example, a worker could have pneumoconiosis and emphysema.

Asbestos and asbestiform fibres, and crystalline silica are carcinogenic and may increase the risk of lung cancer.



## **Pneumoconiosis**

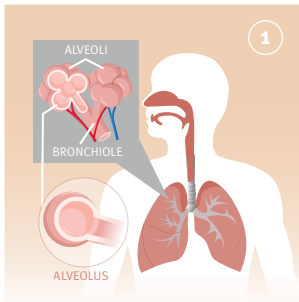
Pneumoconiosis such as CWP, silicosis, and mixed-dust pneumoconiosis are the result of the body repeatedly trying to heal irritations caused by breathing in respirable coal, crystalline silica or mixed dusts.

Respirable dust is so small that, when breathed in, the particles can travel past the body's initial defence mechanisms (such as sneezing and coughing). The smallest particles are able to reach the deepest parts of the lungs (the alveoli), where they are deposited and may remain.

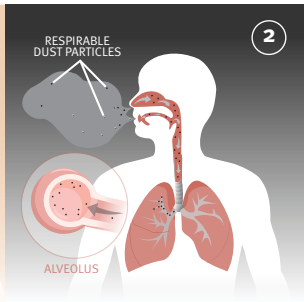
If a worker is exposed to harmful levels of respirable dust over several years, the accumulated damage results in scarring of the lung tissue which reduces the elasticity of the lung, interferes with breathing, and reduces the ability of the lungs to get oxygen from the air into the bloodstream.

The scarring may show up as small, nodular or irregular shapes on a chest X-ray.

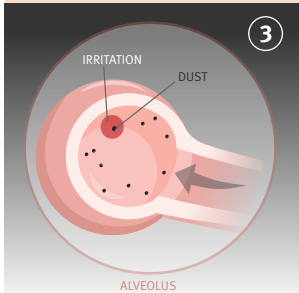
The diagrams on the following pages show how pneumoconiosis, such as CWP and silicosis, develop.



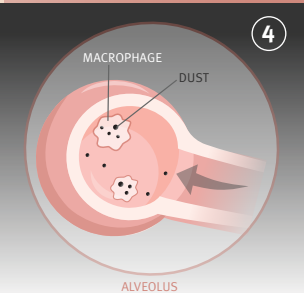
Alveoli are tiny air sacs responsible for exchanging oxygen and carbon dioxide with the blood. A typical pair of lungs contain approximately 700 million alveoli.



Because respirable dust particles are so small, they're able to travel all the way into the alveoli, where they can cause irritation inside the air sac.

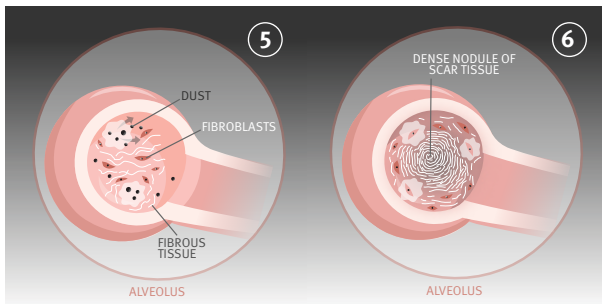


In response to the dust particles, the lung's defence mechanism kicks in. Macrophages, a type of white blood cell, engulf the dust particles to destroy or clear them away.



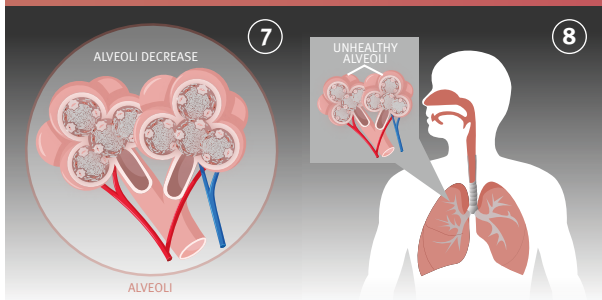
They send out chemicals to attract more macrophages and other similar types of cells. They work together to engulf and clear the dust particles.





If the concentration of dust is too high, fibroblast cells come to the aid of the macrophages. The fibroblasts knit together and form nodules of scar tissue around the particles.

Over time, with continued overexposure to respirable dust, the process repeats many times and more nodules of scar tissue form.



Overcome with scar tissue, the alveoli become unable to function normally, reducing the transfer of oxygen into the bloodstream.

With continued overexposure to respirable dust, the scarring becomes so extensive that it becomes hard to breathe deeply. The amount of oxygen entering the bloodstream is reduced.

***Coal workers' pneumoconiosis (CWP)*** is caused by long-term occupational exposure to harmful levels of respirable coal dust.

In its early stages, CWP is called simple pneumoconiosis. The scars of this form of CWP are small—less than 10 mm in diameter. At this stage, the disease may not prevent a person from working or carrying out most normal activities. Some people with this, or with other forms of mine dust lung disease, can have significant symptoms such as shortness of breath.

In some instances the disease can progress from simple to complicated pneumoconiosis, a condition also called progressive massive fibrosis (PMF). The lung scars are generally greater than 10 mm in diameter.

**Silicosis** is similar to CWP and is caused by prolonged exposure to respirable crystalline silica.

Silicosis may also present in simple or complicated forms. Simple silicosis results in many discrete small white spots (nodules) that can be seen on a chest X-ray or CT scan. In the case of complicated silicosis, there are large areas of scarring called progressive massive fibrosis (PMF).

There are three forms of silicosis based on the duration and severity of exposure:

**Chronic silicosis** – the most common form in mine and quarry workers where fibrosis occurs more slowly over 10–30 years after first being exposed.

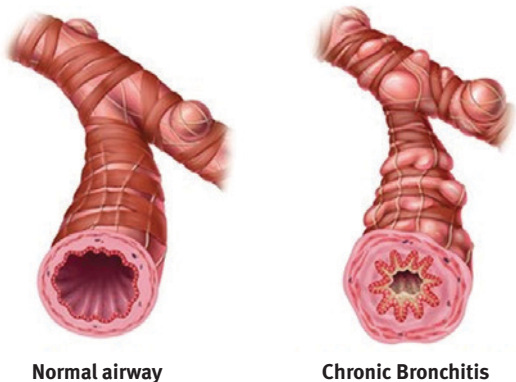
**Accelerated silicosis** – where there is a rapid increase of scarring in the lung within less than 10 years of first exposure.

**Acute silicosis** – the lungs fill with fluid which causes severe breathlessness. This form of silicosis is rare but can develop from very short duration and heavy exposure.

## Chronic obstructive pulmonary disease (COPD)

COPD is a condition that causes shortness of breath by blocking the flow of air out of the breathing tubes of the lungs. The two most common forms of COPD are **chronic bronchitis** and **emphysema**.

**Chronic bronchitis** is an inflammation of the lining of the bronchial passages. The lining becomes swollen and irritated, and the mucus glands in these airways produce a lot of extra mucus (Figure 1). This causes the person to cough and produce sputum or phlegm. Dust is an important cause of chronic bronchitis in mine and quarry workers. Another common cause is smoking.

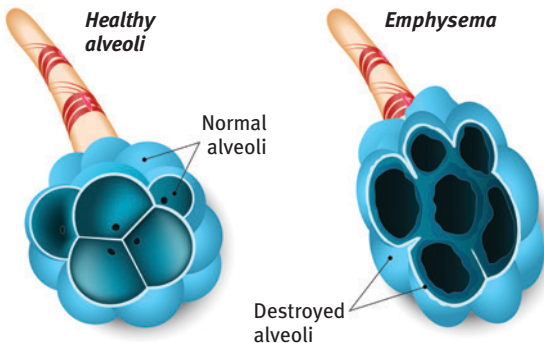


*Figure 1: A normal airway (left) and an airway affected by chronic bronchitis (right).*

**Emphysema** (Figures 2 and 3) is the destruction of the walls of air sacs in the lung, known as alveoli, resulting in enlarged spaces or holes in the lungs like Swiss cheese. This causes shortness of breath in two ways:

- there are fewer air sacs to do the work of getting oxygen into the body
- the damaged lung cannot support the airways normally and they collapse easily.

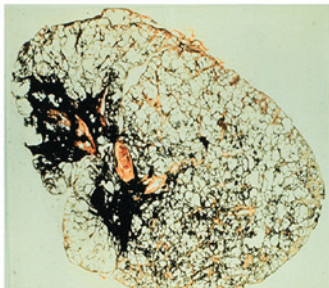
Dust is an important cause of emphysema in mine and quarry workers. Smoking is another very important cause. Inhalation of silica, asbestos, and mixed dusts may also cause emphysema.



**Figure 2:** Normal air sacs of the lung, known as alveoli look like clusters of grapes. In emphysema, these alveoli are damaged and form abnormally large holes. Breathing is impaired as a result of the emphysema.



**Normal lung**

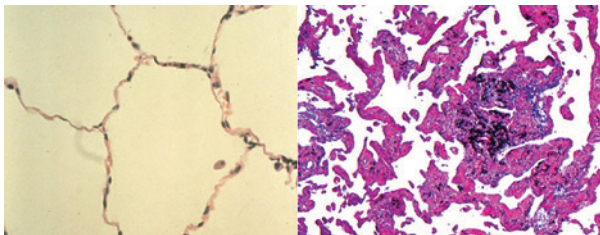


**Coal miner's lung with emphysema**

**Figure 3:** A normal lung (left) and part of a coal miner's lung (right) taken at autopsy. This miner's lung is severely affected with emphysema. There are many holes in the lung instead of normal, spongy lung tissue.

## Diffuse dust-related fibrosis (DDF)

This form of mine dust lung disease is another type of scarring disease (Figure 4). In chest X-rays, the scars appear as irregular linear scars. This is important because some doctors may not be familiar with this form of mine dust lung disease and confuse it with other scarring diseases of the lungs found in the general public.



**Normal lung**

**Diffuse dust-related fibrosis**

*Figure 4: In a normal lung, the air sacs have thin walls (left). In an individual with diffuse dust-related fibrosis, the walls of the air sacs become thickened or scarred.*

## **Asbestosis and asbestos pleural disease**

Mine and quarry workers may be exposed to asbestos and asbestiform mineral dust during their work as naturally-occurring mineral forms of asbestos are encountered.

Asbestos may also be present as insulation in older buildings and preparation plants.

Asbestos can cause lung disease with irregular scars that are often found in the lower parts of the lungs. This may look very similar to diffuse dust-related fibrosis. Asbestos can also affect the lining of the lung, known as the pleura, causing thickened plaques, fluid around the lung, or even cancer of the pleura known as mesothelioma.



## **Detection**

Mine and quarry workers' respiratory health is examined periodically under the Coal Mine Workers' Health Scheme or arranged by the mineral mine or quarry site senior executive.

Employers must pay for the medicals, which include a chest X-ray, spirometry and any other respiratory assessment that the doctor considers relevant.

Workers who have permanently stopped working in the industry, may also be eligible for free respiratory health screening, which also consists of spirometry and chest X-ray. If you qualify, RSHQ will arrange and pay for your respiratory health surveillance including reasonable travel and accommodation costs.

To apply, contact the Mine Dust Health Support Service on **1300 445 715** or email **[info@minedusthealthsupport.com](mailto:info@minedusthealthsupport.com)**

## **Diagnosis**

Changes in lung function, including any damage, can be identified in a number of ways, including:

### **Spirometry**

Damage to the lung can be measured by blowing into special machines called spirometers. Doctors can determine whether the damage is significant or if it is getting worse. These tests can also tell the pattern of damage to the lungs.

These measurements are also used to determine whether it is safe for a worker to return to work in a dusty environment, or if they should only work in low-dust areas, or perhaps might be unable to work in those environments.

### **Chest X-rays**

Evidence of disease can be shown by chest imaging (X-rays or CT scans).

Doctors can see shadows on the X-rays that represent the scar tissue in the lungs caused by pneumoconiosis. Sometimes lung scarring can develop before it is visible on X-ray scans. Scars are even harder to see when the worker also has emphysema.

### **Biopsy**

Very rarely a person may have a lung biopsy which may also verify the presence of disease.

## **Treatment.**

Unfortunately, there is no cure for the damage that dust may have already done. There are some treatments that may relieve symptoms and prevent complications.

Breathing medicines/devices like inhalers are often prescribed. People with mine dust lung disease are strongly encouraged to have the influenza and pneumonia vaccines. Special exercise programs for lung patients are also available.

## Mine Dust Health Support Service

### **MINE DUST HEALTH SUPPORT SERVICE**

**1300 445 715**

[info@minedusthealthsupport.com](mailto:info@minedusthealthsupport.com)

Current or former Queensland mine and quarry workers, and their families and representatives, can contact the Mine Dust Health Support Service. The service provides confidential support to help workers understand:

- their rights
- the screening and diagnosis process
- how to access ongoing support.

If a worker develops a mine dust lung disease because of their work in Queensland, they may be entitled to workers' compensation.

## More information

To keep up to date with the latest advice on respiratory health surveillance and other mine safety and health information, visit the RSHQ website at [www.rshq.qld.gov.au](http://www.rshq.qld.gov.au).

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