Diseases, Disorders and Injuries

Silicosis

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What is silicosis?

Silicosis is an incurable lung disease that can lead to disability and death . Silicosis is the result of the body's response to the presence of the silica particles in the lung. Silica particles are very small in size and can reach deep into the lungs (all the way into the alveoli) where they are removed by white blood cells. Free crystalline silica causes the white blood cells to break open, which form scar-like patches on the surface of the alveolus. When a large number of these "scars" form, the alveolar surfaces become less elastic. Over time, this damage reduces the transfer of gases, which can lead to shortness of breath.

There are three major types of silicosis each with their own set of symptoms:

Acute Silicosis occurs after a few months or as long as 2 years after exposures to extremely high concentrations of silica dust. Signs and symptoms of acute silicosis include shortness of breath, weakness, fever, cough, and weight loss.

Chronic Silicosis is the most common and occurs after 15–20 years of moderate to low exposures. Symptoms may or may not be obvious. People suspected of having chronic silicosis may need to have a chest x-ray to determine if there is lung damage. As the disease progresses, sufferers may experience shortness of breath when exercising and have clinical signs of poor oxygen/carbon dioxide exchange. In the later stages, the sufferers may experience fatigue, extreme shortness of breath, chest pain, or respiratory failure.

Accelerated Silicosis onset is quicker than chronic silicosis, and can be detected after 1–10 years of high exposures. Symptoms include severe shortness of breath, weakness, and weight loss.

What causes silicosis?

Silicosis is caused by inhaling dust that contains free crystalline silica. Development of silicosis is influenced by several factors, which include:

- Amount and kind of dust inhaled
- Amount of free crystalline silica in the dust
- Form of the silica (e.g., crystalline, or amorphous)
- Size of the inhaled particles
- Length of exposure
- Individual resistance
- Smoking habits
- Age of worker

Does silicosis have complications?

Yes. People with untreated silicosis can develop complications including lung cancer, chronic obstructive pulmonary disease (COPD), vulnerability to infections (e.g., tuberculosis), and kidney disease. People who smoke may also develop worse silicosis due to the additional lung damage caused by cigarette smoke.

Who is at risk of developing silicosis?

Exposure to crystalline silica may occur in several industries and occupations due to its wide and varied use. CAREX Canada estimates that approximately 429,000 workers in Canada are occupationally exposed to silica; 94% of these workers are male (2016 data). The largest occupational groups exposed to silica were construction trades labourers, heavy equipment operators, and plasterers and drywallers. However, workers can also be exposed in industries such as mining, agriculture, and manufacturing. Workers who are exposed to workplace activities such as abrasive blasting, cutting, sawing, demolishing, drilling, grinding, jackhammering, milling, mixing, polishing, roofing, sanding, and sweeping can also be at risk of developing silicosis.

How can we prevent silicosis?

There is no effective treatment for silicosis. As such, the only way to protect workers from developing silicosis is to control their exposure to silica-containing dusts.

Workplace exposure to crystalline silica can be controlled in several ways. Workplaces conduct a risk assessment and eliminate or reduce hazards according to the hierarchy of control .

For example:

- **Eliminating or substituting** hazardous products that contain silica with safer alternatives.
- **Engineering controls** are selected to control emissions at their source. These options may include any or all of the following:
  - Process selection
  - Workplace design
  - Equipment selection
  - Modification of existing equipment or processes
  - Ventilation
- **Work practices and procedures** include:
  - Safe handling, use, and disposal of materials containing silica
  - Housekeeping (such as wet sweeping, high-efficiency particulate air (HEPA)-filtered vacuuming or other methods that minimize the possibility of exposure)
  - Maintenance
- **Personal hygiene facilities and practices**: Provide clean washing facilities and eating facilities. **Note:** keeping clothing clean is important as dust can remain on clothing. Exposure can occur when clothes are handled, put on, or taken off causing the dust to become airborne.
- **Education and training**: Provide workers with information and instruction on the hazards posed by free crystalline silica, what measures have been implemented to reduce or control exposures to acceptable levels, and the need for worker cooperation in complying with controls.
- **Personal Protective Equipment (PPE)** may include eye and face protection, skin protection, and respiratory protection (which is dependent on air monitoring results).

A workplace medical surveillance program will not prevent silicosis but may detect early signs of silicosis in workers. Early detection can inform the workplace of the need to improve silica control systems to prevent further exposure to workers. Workers with early signs will be able to obtain treatment and may need to be accommodated.

What should be included in a medical surveillance program?

Medical surveillance programs can be used to track the effects of exposure to silica. It can help protect the health of workers by:

- Identifying workers with conditions that may be aggravated by exposure to silica and establishing medical baseline for determining changes in health.
- Evaluating the effect of silica on workers.
- Providing health education.
- Determining if workers are physically capable of using certain PPE.

Medical surveillance programs can include the following:

- Pre-employment and pre-placement medical examinations.
- Periodic medical examinations.
- Clinical tests (e.g., chest x-rays and pulmonary function tests).
- Health education.
- Record keeping.

Medical surveillance may be required in some jurisdictions. Contact your local jurisdiction for more information.

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