

Occupational Asthma

If you wheeze or have trouble breathing only when you are at work, you may have occupational asthma. Since World War II, as industries have increased use of simple chemicals and organic compounds, breathing hazards have increased. Some 200 substances—gases, vapors, and organic and inorganic dusts—found in manufacturing workplaces and among certain occupations have been identified as causes of asthma. It's estimated that some 11 million workers are exposed to one of these substances.

Who Gets Occupational Asthma? People who get occupational asthma are those who either:

- Become sensitized to an allergen in the workplace and on subsequent exposure have an allergic reaction to the allergen or,
 - Are already asthmatic and have very sensitive airways that react to irritants in the workplace. Health experts believe that between 5 and 15 percent of all cases of asthma may be related to working conditions. Of people with disabling asthma, 15 percent are believed to have been worsened by environmental factors. Estimates vary from region to region because of differences in worksite, exposure, industrial hygiene and engineering factors. Occupational asthma also varies considerably among industries. For example, up to 30 percent of bakers exposed to flour dust get asthma. A disproportionate number of people develop asthma who work in the manufacture of detergents, in the logging or furniture industries or in handling animals. The National Institute of Occupational Safety and Health (NIOSH) has estimated that about 140,000 workers in the United States are exposed to acid anhydride compounds, chemicals used to produce epoxy resins, adhesives and fire retardants. Of these workers, an estimated 20 percent have allergic asthma. Workers in the plastics industry get asthma from exposure to chemicals known as isocyanates. Hair dyes can cause asthma among hairdressers. About 1.4 million health care workers are exposed to latex products, which can cause asthma.
- What Causes Occupational Asthma? A wide range of animal- and plant-derived proteins, insect and plant dusts, chemicals, pharmaceutical agents and bacterial enzymes are believed to cause occupational asthma. They are deposited in the lung in various ways, depending on their size and shape. The symptoms of occupational asthma can occur in several ways. The main distinction is whether the symptoms are an allergic reaction or an irritant reaction:
- For an allergic reaction to occur, a worker must first be sensitized to a substance, usually a protein, called an allergen. That is, the body's immune system on first exposure to this substance misreads the allergen as a foreign substance and makes antibodies to get rid of it. Once this sensitization takes place, it constitutes a permanent occupational injury. An allergic reaction can occur when the patient is again exposed to the substance. Constant exposure can result in severe, disabling asthma. Scientists know little about the length of exposure or the dose needed to produce an allergic response. In most cases, there is a latent period of days or years after first exposure to the occupational allergen before symptoms occur. But once the worker is exposed, very low levels of the substance can provoke an asthmatic reaction.
 - Irritant reactions to substances are more common than allergic reactions and are the short-term worsening of a condition already present. Proving the difference between a permanent allergic injury and a temporary irritant reaction is not perfect. It relies on experience and a detailed history of the condition that includes review of symptoms before starting the job, a physical exam and diagnostic testing.
 - Scientists also have identified a syndrome—Reactive Airways Dysfunction Syndrome (RADS)—which falls somewhere between an acute irritant reaction and allergen-induced asthma. Typically an intense one-time irritant exposure is followed by asthma-like symptoms of coughing, wheezing and shortness of breath. This resolves over days or weeks—and sometimes months.
- What Are Symptoms of Occupational Asthma? Physical symptoms include coughing, wheezing, breathing problems and chest tightness. The skin, eyes and nose may become inflamed. Three basic patterns of asthmatic response can be seen:
- A prompt response of trouble breathing and wheezing within minutes of exposure to the allergen. The condition is worse in 10 to 30 minutes and clears up in 1 to 2 hours. Symptoms often go away soon after the worker leaves the workplace and do not recur on weekends.
 - A delayed or late onset reaction, which often begins 1 to 6 hours after exposure and peaks in 3 to 8 hours. Sometimes it lasts 2 to 36 hours and can recur nightly after a single exposure. It may take days or weeks to resolve.
 - A dual response, both prompt and late onset. Symptoms begin within minutes of exposure and return to normal in 1 to 2 hours. Symptoms flare up again in the evening or after bedtime and continue in some patients for up to 12 hours.
 - Spill of an agent can cause high-level exposure that triggers a reaction quickly.
- How Is Occupational Asthma Diagnosed? To diagnose the condition, your doctor will begin with a careful medical history. This includes a study of the work environment to identify exposure to allergens, gases, vapors, dusts and irritants. Clues include:
- Onset of symptoms within months of starting a job
 - Use of a new industrial agent or process
 - Improvement in symptoms after leaving the work area, on weekends or holidays
 - Symptoms that worsen during certain production procedures when exposure is greatest
 - Other workers similarly affected. If there is a period of time between first exposure to a workplace agent and onset of symptoms, allergies should be suspected. To confirm your asthma, your doctor will give you breathing tests before and after giving you an airways-opening medication. In a challenge test, the doctor may try to reproduce symptoms. You will be asked to inhale histamine or methacholine to provoke a response. The value of such challenges may be limited, though, if there has been a long delay in seeking medical care. To try to confirm the relationship between asthma and a worksite agent, your doctor may use a worksite substance suspected to cause your asthma in the challenge test. If the doctor suspects that the asthma is caused by an allergy, skin testing may be used. An extract of the suspected allergen is used to prick or scratch your skin. If you are allergic to the substance, the area will turn red and swollen. Sometimes skin testing is too dangerous because the suspected agent is too toxic. Then blood tests, such as radioallergosorbent

test (RAST) may be used. They are more costly and less sensitive than skin tests, though. If you still work, you can measure changes in peak flow with a peak flow meter every 1 to 2 hours during the work shift and while away from the workplace. Such monitoring may continue for about 3 weeks—2 weeks at work and 1 week off work. Also record when symptoms and exposures occur and when medication is needed. This allows comparison of symptoms at work versus those away from work.

How Can It Be Treated? If allergy-induced asthma has been diagnosed, you should avoid exposure to the agent that triggers an attack. This may involve moving to another area of the workplace or leaving the workplace altogether. Staying in contact with the substance can be life-threatening. If you have irritant-induced asthma, you should work with on-site health care providers and supervisors to manage the asthma. You should discuss avoidance of the allergen, the ventilation and respiratory protection available, and working in a tobacco-smoke-free environment. Medical treatment (including antiinflammatory therapy with inhaled steroids, sodium cromolyn, or nedocromyl) may prevent worsening of symptoms at work by reducing the underlying irritability of the airways. When it is impossible to leave the workplace, symptoms can be lessened with inhaled sodium cromolyn and corticosteroids. Drug therapy does need routine monitoring. Peak flow monitoring will help you understand how severe your asthma is and what treatment you need. It requires maximal effort and motivation, though. Make sure you are carefully trained in use of the peak flow meter and committed to using this method to control your disease.

What About the Future? Asthma cannot be cured, but it can be controlled by avoiding the triggers of an asthma attack. People with allergy-induced asthma should change their worksite altogether. People with irritant reactions may choose to continue working. For them, simple filter-type face masks will not adequately protect them from exposure to allergens. Air hoods that prevent them from inhaling the air from the factory floor work better. A helmet with a respirator that protects against dusts also works better. Over time, industrial hygienists familiar with manufacturing processes and health problems that can result can help identify agents that cause asthma and find ways to reduce the effects of exposure. For example, they can help redesign processes that produce large particles that cannot be inhaled. This happened in the enzyme detergent industry. Neighborhoods near some of the industries can also be affected by the substances that cause asthma. Redesigned processes to change the nature of the problem substances will help these people as well.