Legionnaires’ Disease



What is Legionnaires’ disease?

The name “Legionnaires’ disease” was coined in 1976 after a respiratory disease affected many delegates attending a convention in Philadelphia held by the American Legion of Pennsylvania. Eventually, the bacteria that was responsible for the disease was isolated and named as Legionella pneumophila.

Two distinct illnesses, Legionnaires’ disease and Pontiac fever, have been associated with the Legionella species. Legionnaires’ disease is a severe pneumonia. Pontiac fever is a mild, non-pneumonia influenza-like illness.

What is the cause of Legionnaires’ disease?

The bacterium responsible for Legionnaires’ disease belongs to the genus Legionella. There are approximately 35 Legionella species known to produce the disease. Legionella species are commonly found in any aquatic environment. They can survive for several months in a wet environment and multiply in the presence of algae and organic matter.

What are the signs and symptoms of Legionnaires’ disease?

Legionnaires’ disease usually begins with a headache, pain in the muscles and a general feeling of unwellness. These symptoms are followed by high fever (up to 40-40.5°C or about 104-105°F) and shaking chills. Nausea, vomiting, and diarrhea may occur. On the second or third day, dry coughing begins and chest pain might occur. Difficulty with breathing is often reported. Most patients develop pneumonia, a condition in which some of the lungs’ air sacs fill with fluid or pus. The pneumonia might involve both lungs and become so severe that hospitalization is required. Pneumonia resulting from Legionnaires’ disease is similar to pneumonia from other causes. Laboratory tests are necessary for a diagnosis.

Mental changes, such as confusion, disorientation, hallucination and loss of memory, can occur to an extent that seems out of proportion to the seriousness of fever. Complete recovery can take several weeks. About 30% of known cases of Legionnaires’ disease have been fatal.

How is Legionnaires’ disease recognized and treated?

To distinguish Legionnaires’ disease from pneumonia from other causes, laboratory tests are needed that are not normally carried out on patients with fever and

pneumonia. The diagnosis is confirmed by laboratory examinations that isolate Legionella from respiratory secretions (sputum) or testing a patient's blood or urine.

Legionnaires' disease is treated with antibiotics. Early treatment helps reduce the chance of serious complications.

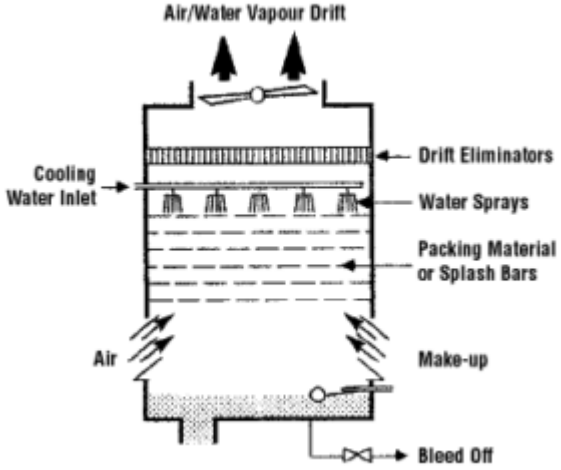
How is Legionnaires' disease transmitted?

The transmission of Legionnaires' disease is not completely understood. The normal presence of Legionella in water and soil is not automatically associated with an outbreak of the disease. It appears that the Legionella microbe must reach the lungs in order to produce the disease. Inhalation of small particles of contaminated water (aerosols) or soil seems to be the key. Aspiration is another way that the Legionella microbes can enter into the lungs. Aspiration means choking during drinking, ingesting or swallowing. This action allows fluids and particles to enter the lungs instead of going into the stomach.

Evidence of person-to-person transmission has not been found. Therefore, attention has focused on the spread of Legionella by ventilation systems in buildings. Legionella can thrive in warm stagnant water. When the circulated air picks up droplets of contaminated water, the bacteria can be transported throughout a building. If the droplets are small enough, they can be inhaled, thus providing a way for the bacteria to enter the lung.

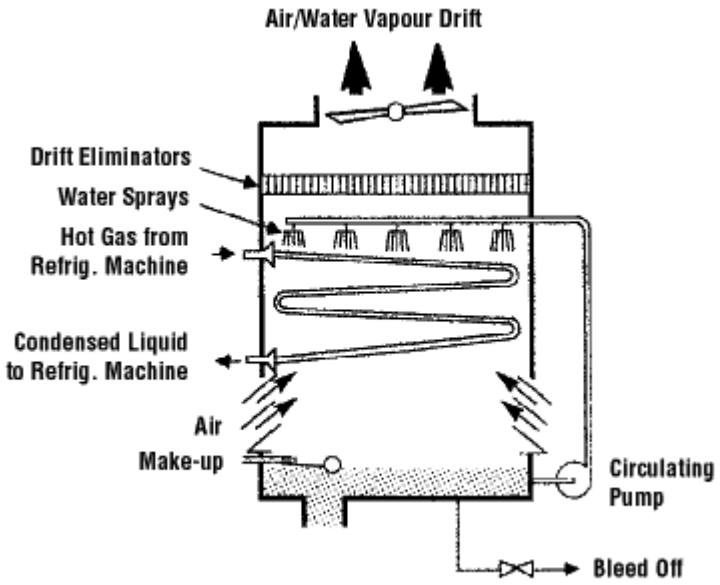
How are Legionella bacteria spread in indoor environments?

Cooling towers are part of large air-conditioning systems. They are used to cool water and dissipate unwanted heat to the atmosphere through water evaporation. Warm water flows into the top of the cooling tower through spray nozzles (as shown in the schematic Figure 1). While the water passes through the nozzles, tiny airborne droplets are formed, providing maximum contact between the water and the air moved through the tower by fans. To prevent droplets from fusing into larger ones, splash bars are placed below the nozzles.



While falling through the tower, some of the water evaporates. Because evaporation consumes heat, the remaining water is cooled. Air pushed through the tower by fans also cools the water. Some droplets, known as drift, are carried out of the tower by the air stream produced by the fans. This water loss is reduced by a drift eliminator positioned at the top of the tower. The cool water collects at the bottom of the tower and is pumped back for another cycle.

Evaporative condensers (Figure 2) are similar in their construction and operation to cooling towers.



Cooling towers and evaporative condensers may contain Legionella and other microorganisms brought in by circulating air or water.

Legionella grows easily in the water, especially if algae and scale are present. Legionella can be dispersed with aerosolized drift or with the evaporate, but it may enter the air-conditioning system if there is a break between its ducts and those of the cooling tower or evaporative condenser.

Legionella has also been found in hot water tanks, hot water from showers and faucets, whirlpool spas, hot tubs, public spas, and humidifiers. It is not known whether Legionella enters a building's water from municipal feeder systems or adjacent contaminated cooling towers.

Who is more likely to get Legionnaires' disease?

Legionnaires' disease usually strikes middle-aged people, although cases have been reported in all age groups. The disease frequently occurs in people whose resistance to infection has been reduced, but apparently healthy people may also develop the disease. People suffering from cancer or chronic kidney diseases are among those less able to fight infections. Chronic diseases, such as Chronic Obstructive Pulmonary Disease (COPD), diabetes and alcoholism, also seem to increase vulnerability to Legionnaires' disease. Cigarette smokers are also more likely to contract Legionnaires' disease.

What occupations are at risk for Legionnaires' disease?

Workers most at risk are those with occupations that require them to work in sealed buildings including those workers who maintain water cooling towers in air conditioning systems.

Some outdoor occupations may be considered at risk as well. Soil disturbed in areas where surface or aerosolized water discharge occurs has the potential to cause exposure to the microorganism.

In a few cases, the Legionella bacteria from cooling towers has survived and spread into the air for distances of several kilometers.

How can we prevent Legionnaires’ disease?

The likelihood of Legionella infection can be best reduced by good engineering practices in the operation and maintenance of air and water handling systems. In all cases, follow the manufacturer’s instructions for operation, cleaning, and maintenance. Cooling towers and evaporative condensers should be inspected and thoroughly cleaned at least once a year. Corroded parts, such as drift eliminators, should be replaced. Algae and accumulated scale should be removed. These measures will not only control the growth of bacteria, but will also maintain operating efficiency. During cleaning operations in confined spaces, safety procedures for entry into confined spaces should be applied.

Cooling water should be treated constantly. Ideally, an automatic water treatment system should be used that continuously controls the quality of the circulating water.

Fresh air intakes should not be built close to cooling towers since contaminated aerosols may enter the ventilation system. Air filters should be examined, cleaned and/or replaced periodically and tested for leaks. Cooling towers should be positioned so the drift or evaporate does not enter the fresh air intake. Hot water tanks, which might provide ideal conditions for the growth of Legionella, should be cleaned regularly. The water system should be flushed out on a regular basis to prevent the water from stagnating.

Source: © Copyright 1997-2021 CCOHS