

Diseases, Disorders and Injuries

Legionnaires' Disease

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What is Legionnaires' disease?

The name "Legionnaires' disease" was first used in 1976 after an outbreak of a type of pneumonia that affected many delegates attending a American Legion Convention in 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 bacteria. Legionnaires' disease is a severe type of pneumonia. Pontiac fever's symptoms are primarily fever and muscle aches (but not pneumonia).

In this document, we refer only to Legionnaires' disease.

What is the cause of Legionnaires' disease?

The bacterium responsible for Legionnaires' disease belongs to the genus Legionella. There are many Legionella species known to produce the disease, however *Legionella pneumophila* is responsible for 85-90% of the cases. Legionella species are commonly found in any freshwater aquatic environments. 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 is a severe type of pneumonia that usually develops 2 to 10 days after exposure to the Legionella bacteria.

Common early signs and symptoms include:

- Headache
- Muscle pain
- General feeling of malaise

After a couple days, other signs and symptoms will develop, which may include:

- Fever (up to 40-40.5°C or about 104-105°F)
- Gastrointestinal symptoms (nausea, vomiting, diarrhea)
- Dry cough
- Chest pain
- Shortness of breath or difficulty breathing
- Confusion or other mental changes (disorientation, hallucination, loss of memory)

Most patients develop pneumonia, a condition in which some of the lungs' air sacs fill with fluid or pus. If pneumonia symptoms are developed, contact a doctor or healthcare professional for guidance. Laboratory tests are necessary for a diagnosis of Legionnaires' disease.

Complete recovery may take several weeks. About 15-25% of known cases of Legionnaires' disease have been fatal.

How is Legionnaires' disease recognized and treated?

To distinguish Legionnaires' disease from other types of pneumonia, laboratory tests are needed that are not normally carried out on patients with fever and pneumonia. Therefore, if there is a possibility of exposure to the Legionella bacteria, the doctor must be informed to conduct the required tests. The diagnosis is confirmed by laboratory examinations that isolates 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 normal presence of *Legionella* in water and soil is not automatically associated with an outbreak of the disease.

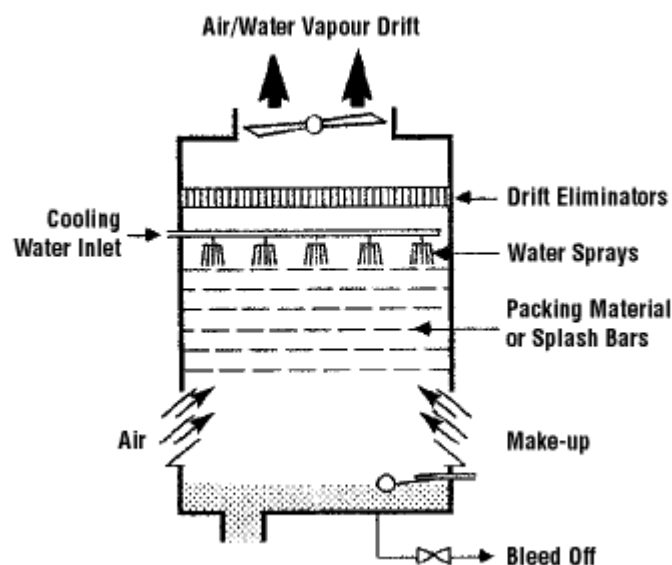
Aspiration, although less common, is another way that the *Legionella* microbes can enter into the lungs. Aspiration is defined as the entry of a liquid or solid into the trachea or lower respiratory system directly through the oral or nasal cavity, or indirectly by vomiting. In other words, aspiration occurs when instead of something going from your mouth or nose to your stomach (other than air), it enters the lungs.

Evidence of person-to-person transmission has not been found, nor is there any documentation of animal-to-person transmission.

Warm, stagnant water can promote bacteria growth, including the growth of *Legionella*. In buildings, *Legionella* can be spread through ventilation systems when circulated air picks up droplets of contaminated water. If the droplets are small enough, they can be inhaled, and the bacteria can enter the lung.

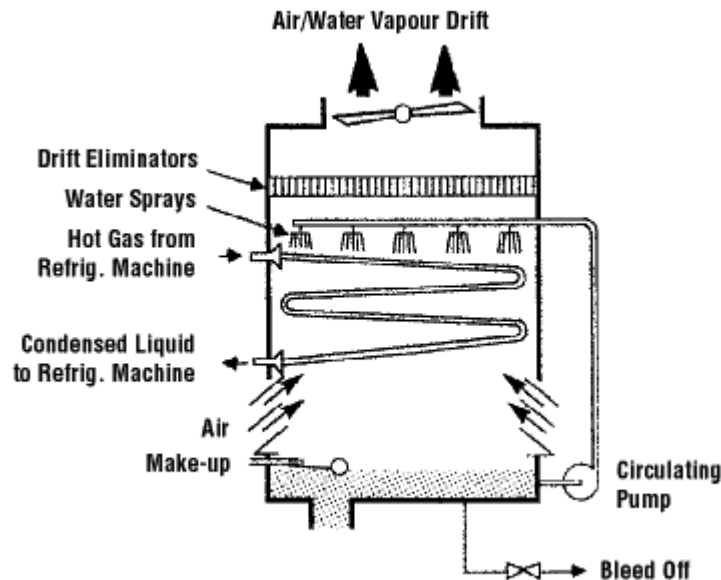
How are *Legionella* bacteria spread in indoor environments?

Cooling towers are part of large air-conditioning systems. They are used to cool water and dissipate unwanted heat through evaporation. Warm water flows into the top of the cooling tower through spray nozzles (as shown in Figure 1). When the water passes through the nozzles, tiny aerosols 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. Air/Water Vapour Drift is shown exiting the top of the tower.



As the aerosols fall, some of the water evaporates, cooling the water. The water is also cooled by the fans pushing air through the tower. 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, and 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, faucets and showerheads, 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 affects people 40 years or older, although cases have been reported in all age groups. People that have underlying health conditions are at an increased risk of getting sick. This concern includes people with:

- Cancer
- Diabetes

- Kidney or liver failure
- Chronic lung diseases (like emphysema or chronic obstructive pulmonary disease (COPD))

Smoking may also increase the risk of illness.

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.

Since Legionella is found naturally outdoors near water sources, some outdoor occupations may be considered at risk as well; however, the number of bacteria found in these locations is generally not high enough to cause disease in people. 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 of ventilation systems and air ducts for distances of several kilometers.

How can we prevent Legionnaires' disease?

The likelihood of Legionella exposure may be reduced by good engineering practices which includes proper maintenance and operation of air and water handling systems and mist-producing devices. These devices include shower heads, hot tubs, humidifiers, and whirlpool bathtubs. 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.

Never enter a confined space without proper instruction or training. All safety procedures must be followed if required to enter a [confined space](#) for cleaning or de-scaling.

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 to reduce the risk of contaminated aerosols from entering the ventilation system. Air filters should be examined, cleaned and/or replaced periodically and tested for leaks.

Hot water tanks and water systems which might provide ideal conditions for the growth of Legionella, should be cleaned and flushed regularly to prevent the water from stagnating.

Fact sheet last revised: 2021-07-08

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