Legionellosis

Legionellosis is caused by bacteria found in natural aquatic environments such as rivers, lakes and other standing water. The number of bacteria in natural environments is small, so natural environments are usually not a source of infection for humans.

Legionella from the natural environment enter water systems used for drinking water supply, cooling (cooling towers), swimming pools, industrial swimming pools, etc. *Legionella* multiply best in warm water. In an unnatural, artificial environment, *Legionella* multiply rapidly at the right temperature and other environmental factors and start to pose a threat to human health.

The cause

The disease is caused by the bacterium *Legionella*. More than 50 species of *Legionella* are known, and about 20 species are associated with human disease. In Europe, *Legionella pneumophila* serogroup 1 is the most common causative agent of Legionellosis.

Incubation period

The time from infection to disease onset is usually 2–10 days, and in rare cases 16-20 days from exposure to the infectious source.

Transmission

The usual route of infection is via infectious aerosol - inhaling tiny droplets suspended in the air that contain *Legionella*. The smaller the *Legionella* droplets, the greater the chance of infection. Droplets with a diameter of less than 5µm can reach the lower parts of the airways more easily than larger diameter droplets. Particularly dangerous are aerosols of contaminated water from showers, swimming pools where the water is bubbling, cooling tower exhausts, ornamental fountains, etc. Poorly maintained plumbing systems and air-conditioning systems, where air comes into contact with contaminated water, pose a risk of infection. Water above 20°C and up to about 50°C, which produces aerosols, is a hazard.

Drinking contaminated water does not give you the infection, as the liquid you drink goes into your stomach, where the *Legionella* is destroyed by acidic gastric juice. Exceptionally, patients with a severely weakened immune system could become infected by drinking it.

Human-to-human transmission has not been proven, which means that it can only be contracted from a water source, not from person sick with legionellosis.

Susceptibility to infection

Host defence is based on cell-mediated immunity. *Legionella* infection also produces antibodies that do not protect against reinfection.

The elderly, chronically ill, immunocompromised, smokers and alcoholics are more susceptible to *Legionella* infection. There are more confirmed *Legionella* infections in men.

Symptoms and signs of the disease

Two different forms of the disease develop after infection with *Legionella*: Pontiac disease or Legionnaires' disease.

Pontiac disease is a milder form of infection and is similar in course to influenza. The symptoms appear suddenly, with fever, headache and muscle aches. Half of the patients also develop signs of upper respiratory tract infection - sore throat and runny nose. The illness lasts 2–7 days, resolves on its own and is without consequences.

Legionnaires' disease is a form of pneumonia that cannot be distinguished from other bacterial pneumonias by its symptoms and signs. The course of Legionnaires' disease varies in severity - younger, healthy people get over mild pneumonia and recover quickly. However, a severe, complicated course requiring hospital treatment is more common in the elderly, chronically ill, immunocompromised people and smokers. In addition to the lungs, other organs (e.g. liver, kidneys, brain) are affected.

Legionnaires' disease starts with fatigue, loss of appetite, headache, fever and muscle pain. The temperature rises to 40°C or more. About a third of patients have diarrhoea, abdominal pain, nausea and vomiting. Patients usually cough dryly, sputum appears later, and can be purulent or even bloody. Patients experience chest pain with deep inspiration, which is due to pleurisy. The more severe course makes older patients especially drowsy and/or confused.

On examination, the doctor finds that the patient has pneumonia. A patient who does not have a severe course can be treated at home. However, if the patient has a very high fever, is confused, or is short of breath, referral and treatment in hospital is necessary.

Legionnaires' disease has no specific clinical features that clearly distinguish it from other types of pneumonia, so laboratory tests on sputum, blood and/or urine samples are needed to make a diagnosis. The most commonly used method to prove Legionnaires' disease is to test the patient's urine for the presence of *Legionella* antigen.

Infectiousness

Patients with Pontiac disease or Legionnaires' disease are not infectious because these bacteria are not transmitted between people. Therefore, there are no special measures to take when coming into contact with a patient.

Treatment

Pontiac disease goes away on its own and is not treated with antibiotics. However, patients with Legionnaires' disease should receive an antibiotic that is effective against *Legionella* (macrolide antibiotic or fluoroquinolone) as soon as possible. Beta-lactam antibiotics (e.g. ampicillin, amoxicillin with clavulanic acid, penicillin, cephalosporins) are not effective.

Prevention of infections

There is no vaccine against *Legionella*. Infection is prevented by careful maintenance of plumbing systems and aerosol-generating appliances, which are a potential source of infection.

Actions to prevent the infection:

- Regular cleaning and descaling of taps and showers.
- Cleaning boilers and removing linings, where bacteria like to breed.
- Removing 'blind sleeves' in water systems where there is no flow to allow bacteria to grow.
- Control of the temperature in the water supply system, which must be high enough (50°C to 60°C) to prevent *Legionella* growth or lower than 20°C. *Legionella* do not grow in cold water.
- Proper maintenance of aerosol-producing devices (air conditioners, fountains, etc.).

There is little point in sampling and confirming *Legionella* in domestic water supplies. *Legionella* occur sporadically in the water system, so a negative result does not mean that *Legionella* are not present. It is more important to take care of our domestic water system and properly maintain other potential sources of *Legionella* (e.g. air conditioners) to reduce the risk of infection.

We advise against using thermal pools for patients with severely weakened immune systems (e.g. bone marrow transplants, internal organ transplants, chemotherapy, high doses of corticosteroids, certain biologic drugs). Warm pool water (especially if aerosols are produced, such as in a whirlpool) can be a source of legionellae, which can pose a very high risk to the health of such patients.