

## ***Leptospira***

### **General description**

Leptospirosis is caused by leptospire; these zoonotic bacteria can be divided in two genera *Leptospira* and *Leptonoma*. Leptospirosis is caused by *Leptospira interrogans* of the pathogenic *Leptospira* genus. More than 200 pathogenic serovars have been identified and these have been divided into 25 serogroups based on serologic relatedness.

### **Human health effects**

The disease is spread globally affecting people living in temperate and tropical climates in both rural and urban areas. There is a wide variety of symptoms such as fever, headache, muscle pain, chills, redness in the eyes, abdominal pain, jaundice, hemorrhages in skin and mucous membranes (including pulmonary bleeding), vomiting, diarrhea and rash. Pulmonary bleeding has been recognized as a dangerous and often fatal result of leptospirosis but the way it develops after infection remains unclear. Long lasting sequelae have been identified including depression, headaches, fatigue and joint pains. Weil's disease characterized by jaundice, renal failure, haemorrhage and myocarditis has been used as an alternative term for leptospirosis but it represents a subset of the manifestations. Estimates of case fatalities vary from < 5% to 30% but the figures are not considered reliable due to uncertainties over case prevalence. Fatality rates are influenced by timeliness of treatment interventions. The number of cases is not well documented due to lack of awareness and adequate methods of diagnosis. It has been estimated that there are about 0.1-1 cases per 100,000 persons per year in temperate climates and up to 10-100 cases per 100,000 persons per year in tropical climates.

### **Source and occurrence**

Rats, especially the brown rat (*Rattus norvegicus*), serve as a reservoir for *Leptospira interrogans* serovars icterohaemorrhagiae and copenhageni. Cattle is the most important reservoir for serovar hardjo; field mice (*Microtus arvalis*) and musk rats (*Ondatra zibethicus*) for serovar grippityphosa. Recent research has shown that the house mouse (*Crocidura russula*) may be a reservoir for serovar mozdok (type 3). Water contaminated with urine and tissues of infected animals is an established source of pathogenic leptospire. Leptospire have a relatively low resistance to adverse environmental conditions (e.g. low pH, desiccation, direct sunlight) but in the right circumstances (neutral pH, moderate temperatures) they can survive for months in water.

### **Routes of exposure**

*Leptospira interrogans* can enter the body when the skin is damaged or via the mucous membranes of the mouth, nose and eyes. Leptospirosis is associated with a broad range of occupational activities predominantly associated with direct contact with dead or living animals but also indirectly via urine contaminated environments, especially surface water, plants and mud. Direct person to person transmission is rarely observed. Sexual contact, transplacental transmission and mother's milk are potential routes of exposure. Transmission via urine of infected patients could represent a risk to those that provide medical attention. There is an increasing trend of outbreaks associated with recreational

exposure to water contaminated with urine from infected animals. Outbreaks have also been associated with natural disasters involving flooding.

### **Significance in drinking water**

Leptospirosis is associated with contact with contaminated surface water. Leptospire are sensitive to disinfectants and within a WSP control measures that should provide effective protection against this organism include application of standard disinfection processes for drinking water together with protection of distribution systems from contamination associated with flooding events. Due to Leptospire being excreted in urine and their persistence in favourable environments *E.coli* (or, alternatively, thermotolerant coliforms) is not a suitable index for the presence/absence of this organism.

### **Selected bibliography**

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