



Plague

Pathogen: *Yersinia pestis*

Occurrence

Plague is an acute infectious disease caused by the pathogen *Yersinia pestis*. It occurs in all climatic zones, but due to ecological reasons is now limited primarily to warm areas (Africa and Asia). The bubonic plague is transmitted by rodents that were bitten by infected fleas. It is seldom transmitted through direct animal contact. Generally, smear infections from open plague boils are very rare. Person-to-person transmission from fleas as well as from airborne droplets is also possible; this causes pneumonic plague.

Identification

Bubonic plague: Infection begins with a flea bite and the localised spread of the germ. It causes the lymph nodes to swell (buboes). This is accompanied by a high fever, chills and septicaemia (severe bacterial infection of the bloodstream). If left untreated, the mortality rate is between 40% and 60%; if treated early, this falls to 5-10%.

Pneumonic plague: This is transmitted through the inhalation of airborne droplets. It is characterised by an abrupt onset of symptoms, accompanied by high fever, coughing up of blood, chest pains and shortness of breath, followed by advanced pneumonia and mucopurulent sputum. Generally, septicaemia leads to blood poisoning as well as lung and heart failure. If left untreated, there is a 100% mortality rate; with treatment this falls to 60%.

Diagnosis

Plague is diagnosed by isolating the pathogen from the blood, sputum, pus and tissues. This diagnosis is then confirmed by immunological and molecular tests.

Transmission

Bubonic plague is transmitted by infected fleas or through contact with infected animals. Airborne droplet infection (pneumonic plague) from person to person is only possible through direct contact with infected patients (at a distance of less than 2 metres) and causes pneumonic plague. A bioterrorist attack involving the release of these pathogens in aerosol form would also lead to pneumonic plague. The infective dose in animal experiments is 100 bacteria.

Incubation period

Bubonic plague: between 2 and 10 days; pneumonic plague: a few hours to 2 days.

Prophylaxis

At present, there is no effective vaccination. Anyone who has come into contact with an infected person should be treated prophylactically with antibiotics.

Therapy

Plague can be treated effectively with antibiotics, (gentamicin, ciprofloxacin, docycyclin), insofar as the therapy is initiated in the early stages of the disease. Supportive therapy could also be administered.

Yersinia pestis as a biological weapon

The first reported case of plague being used as a biological weapon dates back to the epidemic in the 14th century. The Tatars catapulted their plague-ridden corpses over the city walls of Kaffa (now the Crimean peninsula). As a result of their actions, they were able to capture the city within days.

Survivors of this war, who managed to escape to Europe, were the source of the plague epidemic that would sweep through Europe, killing a third of the population. In the last century, a number of countries have cultivated the plague pathogen, and have attempted to turn it into weapons-grade spores which could be dispersed in aerosol form. Plague has other properties which contribute to its bioweapon potential. First, plague pathogens are relatively resistant to environmental influences. Second, they can be released in aerosol form and thus spread quickly as a result of person-to-person transmission.