What is plague?

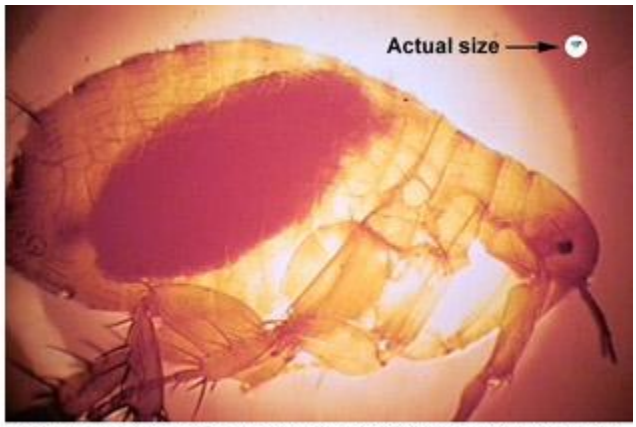

Image: Xenopsylla chepsis (oriental rat flea) engorged with blood

Plague is an infectious disease caused by the bacterium *Yersinia pestis*. Plague most commonly occurs in rodents and their fleas, but it also can occur in humans when they are bitten by fleas infected with the plague bacteria. There are three types of plague: bubonic, pneumonic and septicemic. Primary pneumonic plague occurs when the disease is acquired via the respiratory tract without having the bubonic plague; it is considered secondary when it is caused by the bacteria spreading to the lungs after the bubonic form is contracted. Primary pneumonic plague is considered one of the diseases most likely to be used in a bioterrorism event. In a bioterrorist attack, health authorities are concerned about the plague bacilli being released into the air where they can be breathed into a person's lungs.

How common is plague and who can get it?

Outbreaks involving people can occur in areas where housing and sanitation conditions are poor. Large outbreaks are now rare, but cases of plague, primarily the bubonic form, still arise regularly in endemic areas. For example, 10 to 15 cases occur each year in the southwestern United States. Few physicians in the United States have ever seen a case of pneumonic plague.

How is pneumonic plague transmitted?

Pneumonic plague occurs when *Yersinia* pestis infects the lungs. Transmission can take place if someone breathes in *Y. pestis* particles, which could happen in an aerosol release during a bioterrorism attack. Pneumonic plague is also transmitted by breathing in *Y. pestis* suspended in respiratory droplets from a person (or animal) with pneumonic plague. Respiratory droplets are spread most readily by coughing or sneezing. Becoming infected in this way usually requires direct and close (within 6 feet) contact with the ill person or animal. Pneumonic plague may also occur if a person with bubonic or septicemic plague is untreated and the bacteria spread to the lungs.

What are the symptoms of pneumonic plague?

Infection of the lungs with the plague bacterium causes the pneumonic form of plague, a severe respiratory illness. The incubation period is one to six days for primary pneumonic plague. The first signs of illness are high fever, chills, myalgia, weakness and headache. Within 24 hours of the onset of the flu-like symptoms, infected persons will likely experience chest discomfort, labored breathing and cough, which produces bloody or watery sputum. The pneumonia progresses over two to four days and may cause septic shock and, without early treatment, death. Death results from respiratory failure, circulatory collapse and bleeding.

Is plague fatal?

About 14 percent of all plague cases in the United States are fatal. Pneumonic plague is the most severe form of the disease and death occurs in approximately half of the cases.

Can pneumonic plague be spread from person to person?

Person-to-person transmission of pneumonic plague occurs through respiratory droplets, which can infect those who have face-to-face contact with an ill patient.

How is pneumonic plague diagnosed?

Laboratory tests should be performed, including blood cultures for plague bacteria and microscopic examination of blood and sputum samples. A presumptive diagnosis can be made quickly based on symptoms and concurrent lab results.

Is there a treatment for pneumonic plague?

Treatment should be initiated as soon as a diagnosis of plague is suspected; it should not be delayed awaiting confirmatory testing. Doctors can prescribe several antibiotics, including streptomycin, tetracycline and chloramphenicol. To be effective, treatment must begin early. If left untreated, the disease can be fatal. Antibiotic resistance is rare in naturally-occurring plague, but could be a concern in a bioterrorism event.

Is there a way to prevent infection?

Prophylactic antibiotic treatment for seven days will protect persons who have had face-to-face contact with infected patients.

Is there a vaccine available?

Despite ongoing research, there is no vaccine currently available to the general public. A killed whole-cell vaccine was available in the United States until 1998, when it was discontinued. Although it was very effective against bubonic plague, it required multiple injections and had little or no efficacy against pneumonic plague.

If someone comes down with pneumonic plague, how can the spread of the disease be stopped?

The bacterium that causes pneumonic plague is highly transmissible. Persons diagnosed with suspected plague should be hospitalized and medically isolated so that they will not continue to spread the bacteria. Isolation can be discontinued after 48 hours of appropriate antibiotic therapy if the patient demonstrates clinical improvement. In addition, people in close contact with patients who have untreated pneumonic plague or individuals who are potentially exposed to aerosolized *Y. pestis* should receive post-exposure antibiotic treatment for seven days. In a community experiencing a pneumonic plague epidemic, all persons who develop a fever or new cough should promptly begin antibiotic treatment.

If plague is discovered or released into the environment, how can that area be decontaminated?

Y. pestis is a relatively fragile organism and can remain viable for only about one hour after an aerosol release. Environmental decontamination following aerosol release of plague is unnecessary. Standard hospital-approved disinfectants are adequate for cleaning patient rooms.

Last updated January 7, 2003