

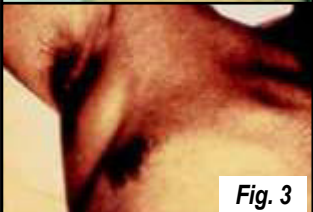





Question	Answer
1. Is plague contagious between humans?	a. Yes— <i>pneumonic plague</i> is contagious between humans. The last case of human-to-human transmission of plague in the U.S. occurred in Los Angeles in 1924. b. There are three (3) forms of plague: pneumonic (plague germs in the lungs), septicemic (plague germs in the blood), and bubonic (plague germ in lymph nodes, also called buboes). c. <i>Neither bubonic nor septicemic plague spreads directly from person to person.</i>
2. How do humans “catch” plague?	A person can become infected with the plague germ through a. A bite from plague-infected rodents (e.g., rats, ground squirrels, prairie dogs) or their fleas; b. A bite from an infected domestic cat or dog or its fleas; or c. Breathing in air containing the plague germ. In a bioterrorist attack, for example, plague sprayed into the air can infect people who breathe the air. Aerosolized plague is infectious for one hour after release.
3. What are the hallmarks of infection with the plague germ?	Human infection with plague shows up three (3) main ways depending on how the germ first enters the body: a. Fever and swollen painful lymph node or “bubo” (84 percent of infected persons will have this kind of plague infection, which is called “bubonic plague”) b. Fever and bleeding (13 percent of infected persons will have this kind of plague infection, which is called “septicemic plague”) c. Fever and difficulty breathing (2 percent of infected persons will have this kind of plague infection, which is called “pneumonic plague”)
a. Fever and swollen painful lymph node (“bubo”)   	i. A swollen painful lymph node (bubo) develops where the body’s immune system attempts to fight the plague germ after it enters the body through the bite of an infected flea or rodent. ii. The size of the bubo varies between one-half inch and four inches in diameter. If the person is bitten on the hand, the swollen painful lymph node will likely be in the armpit on the same side of the body as the bite. If the person is bitten on the leg, the swollen painful lymph node will likely be in the groin on the same side of the body as the bite. iii. Fever between 101 and 104 degrees Fahrenheit scale, chills, and body aches accompany the bubo. iv. Fever and bubo develop approximately 2-8 days after an animal infected with the plague germ bites a person. v. A pustule or skin ulcer may occasionally develop at the site of the original bite. vi. Persons sick with bubonic plague most likely acquired it naturally (i.e., from infected rodents and their fleas), rather from a terrorist attack. vii. Infected persons with the bubonic form of plague can develop septicemic plague if the germ makes its way out of the lymph node into the bloodstream. viii. Infected persons with the bubonic form of plague can also develop pneumonic plague if the germ makes its way out of the lymph node into the bloodstream and then travels to the lungs. 20 percent of persons with bubonic plague will develop pneumonia due to plague. ix. Approximately 14 percent of people with the bubonic form of plague die from the infection. <i>Fig. 1</i> A bubo. A tender, swollen lymph node in the groin area of a plague victim. The bubo forms generally in the region of the body where the infected flea has bitten the victim. Photo: Jack Poland, Ph.D, CDC, Fort Collins, CO <i>Fig. 2</i> A femoral bubo, the most common site of an erythematous, tender, swollen, lymph node in patients with plague. This painful lesion may be aspirated in a sterile fashion to relieve pain and pressure; it should not be incised and drained. The next most common lymph node regions involved are the inguinal, axillary (<i>Fig. 2</i>), and cervical areas. Bubo location is a function of the region of the body in which an infected flea inoculates the plague bacilli. Photo: Ken Gage, Ph.D., Centers for Disease Control and Prevention, Fort Collins, Colo.



Question	Answer
<p>b. Fever and bleeding</p>  <p>Fig. 4</p>	<ul style="list-style-type: none"> i. Some persons infected with the plague germ skip the bubo stage and develop bloodstream poisoning—called septicemic plague. ii. The plague germs damage the human body’s blood clotting system so that tiny blood vessels start to leak blood into surrounding body tissues. Infected persons may first notice tiny dark skin spots, about the size of a pencil tip. As the leaking continues, large bruises may develop that can sometimes cover an entire side of an arm or leg. iii. Bleeding internal organs (heart, brain, kidney, liver) may begin to soften as the disease progresses, and finally fail to work at all, causing low blood pressure, seizures, coma, and death. iv. Approximately 22 percent of people with the septicemic form of plague die from the infection. <p>Fig.4 The “Black Death.” A victim recovering from bubonic plague. At one time this person’s entire body was black. Reprinted from McGovern TW, Friedlander AM. Plague. In: Sidell FR, Takafuji ET, Franz DR, eds. Medical Aspects of Chemical and Biological Warfare. Chapter 23 in: Zajtchuk R, Bellamy RF, eds. Textbook of Military, Medicine. Washington, DC: US Department of the Army, Office of the Surgeon General, and Borden Institute; 1997: 493</p>
<p>c. Fever and difficulty breathing</p>	<ul style="list-style-type: none"> i. When plague germs are breathed in, they cause a high fever (between 101 and 104 degrees Fahrenheit scale) and difficulty breathing. Infected persons are too sick to leave bed. They have a bad cough early on in the illness when they still have physical vigor. They may cough up blood. ii. The fever and difficulty breathing develop approximately 1-2 days after the infected person has breathed in the plague germ. iii. One clue to a bioterrorist attack with plague germs sprayed into the air would be a number of persons sick with pneumonic plague and no buboes. iv. Before antibiotics were discovered, persons sick with pneumonic plague often became extremely ill with severe pneumonia leading to breathing failure and rapid death within 2-4 days. v. Approximately 57 percent of people with the pneumonic form of plague die from the infection.
<p>4. What else could the illness be?</p>	<ul style="list-style-type: none"> a. Pneumonic plague can be mistaken for many different diseases, including influenza and community-acquired pneumonias (“walking pneumonia”). b. The sudden appearance of many patients sick with fever and cough, a rapid downward clinical course, and a high rate of death should suggest either anthrax or plague. Coughing up blood favors the diagnosis of pneumonic plague. c. One of the main reasons doctors sometimes have difficulty diagnosing plague in the early part of the infected person’s illness is because plague infection has three different forms, and each form can mimic many other diseases.
<p>5. When is an infected person <u>most</u> contagious to other humans?</p>	<ul style="list-style-type: none"> a. The respiratory (coughing and sneezing) droplets of persons infected with the pneumonic form of plague can cause plague in other persons who are within six feet of the sick person. b. Persons with the bubonic or septicemic forms of plague are not contagious to other persons.



Question	Answer
<p>6a. How can a non-infected person keep from catching <i>pneumonic plague</i>?</p>	<ul style="list-style-type: none"> i. <u>Stay away</u> from someone infected with pneumonic plague unless you are a caregiver. ii. <u>Isolation</u>: Persons suspected as having pneumonic plague should be maintained under respiratory droplet infection control precautions for 48 hours after antibiotics treatment begins. Persons who have confirmed pneumonic plague should be kept under respiratory droplet precautions until sputum cultures are negative for growth of the germ. Persons in whom pneumonic plague has been excluded warrant standard precautions only. iii. <u>Mask/Eye Protection/Facemask</u>: Always wear a high-quality mask or face shield to cover your eyes, nose and mouth when in an infected person's care space. N95 (or higher) properly fitted HEPA-filtered respirator facemask works well. Dispose of the mask in the special container in the infected person's care space. iv. <u>Hand washing</u>: Wash your hands <i>before and after</i> touching the infected person's body, body fluids (for example, pustules, vomit, urine, blood, saliva), and personal items (for example, blankets, eyeglasses, fork). Plain soap works fine. v. <u>Gloves</u>: Always wear disposable vinyl or latex gloves when entering the infected person's care space. Sterile gloves are not necessary. Change gloves often and always when leaving the infected person's care space. Always wash your hands after removing gloves. Dispose of gloves in special container in infected person's care space. vi. <u>Gown</u>: Always wear a paper (disposable) hospital gown in the infected person's care space. Dispose of the gown in special container in victim's care space. Cloth gowns require special handling and laundering. vii. <u>Shoe covers</u>: Always wear disposable shoe covers when in the infected person's care space. Dispose of shoe covers in a special container in the care space.
<p>6b. How can a non-infected person keep from catching all types of plague?</p>	<p>In some parts of the world, including the western U.S. (e.g., New Mexico, Arizona, Colorado, California), plague is enzootic in the rodent population. People who live in such areas should do the following to reduce the risk of becoming infected with plague:</p> <ul style="list-style-type: none"> i. Eliminate sources of food and shelter for rodents near homes. ii. Modify homes to prevent rodent access. iii. Treat domestic dogs and cats weekly with appropriate insecticides. iv. Avoid direct contact with sick or dead rodents. v. Handle severely ill cats with extreme caution (these animals should be examined by a veterinarian). vi. Hikers, campers and other persons who participate in outdoor recreational activities should avoid handling sick or dead animals, avoid rodent nests and burrows, use insect repellents containing N,N-diethyl-m-tolamide (DEET) on skin and insecticidal sprays on clothing, and treat accompanying pets with appropriate insecticides. vii. Hunters should always wear gloves when handling dead animals.



Fig.5 Rock squirrel coughing the blood-streaked sputum of pneumonic plague. Photo: Ken Gage, Ph.D., CDC, Fort Collins, CO.



	Question	Answer
7.	Where should infected persons receive care?	Persons with <i>pneumonic and septicemic plague</i> should receive hospital-based care. They will require advanced medical supportive care in addition to antibiotics. Complications of gram-negative sepsis would be expected, including adult respiratory distress syndrome, disseminated intravascular coagulation, shock, and multiorgan failure.
8.	Who should be told of a suspected, probable or confirmed case of plague?	Immediately notify the following of a suspected case of plague: a. Hospital epidemiologist or infection control practitioner. b. State and local public health department: IDPH: 217-782-4977; DuPage County Public Health: 630-682-7400 c. Illinois Region VIII POD Hospital (Loyola): 708-216-8705 d. Illinois Emergency Management Agency: 800-782-7860
9.	Who besides the person with <i>pneumonic plague</i> should be isolated because of possible infection with plague?	Close contacts <u>who refuse antibiotic prophylaxis</u> should be isolated and observed carefully during the first seven days after exposure for the development of fever and cough, and treated immediately if either should occur. Close contact is defined as contact with a patient at less than 6 feet..
10.	What laboratory studies need to be performed?	a. When plague is suspected, specimens of sputum, blood and lymph node aspirates, as appropriate, should be collected for culture and Wright, Giemsa, or Wayson staining. b. Rapid diagnostic tests are available only at some health departments, the CDC and military laboratories. c. The plague germ can be diagnosed in biological safety level 2 (BSL-2) laboratories typically found in community hospitals. Examination of cultures should be done in a biological safety cabinet because of the small chance that manipulation might cause <i>splash or splatter</i> resulting in some of the germs becoming airborne.
11.	What can be done to help infected persons get better?	Treatment with antibiotics is essential. a. When a small number of people are sick with plague, individual medical management with streptomycin or gentamicin given by injection is recommended. For a list of other antibiotics that may be used in place of streptomycin or gentamicin, see Henderson, et al. p 133 (See Question 16). b. When a large number of people are sick with plague, doxycycline or ciprofloxacin taken by mouth is the preferred choice for treatment. These antibiotics are included in the national pharmaceutical stockpile maintained by the CDC. See Henderson, et al. page 133 for dosages (See Question 16). c. Once it is known or strongly suspected that <i>pneumonic plague cases</i> are occurring, anyone with fever (temperature equal to or greater than 101 degrees Fahrenheit) or new cough in the presumed area of exposure should be immediately treated with antibiotics for presumptive pneumonic plague. d. Asymptomatic persons (i.e., persons who have no symptoms of plague) who have household, hospital or other close contact with persons with untreated pneumonic plague, may be protected from infection by treatment with doxycycline by mouth for 7 days. Close contact is defined as contact with a patient at less than 6 feet. e. Antimicrobial resistance should be considered in patients who become sicker in spite of therapy.



	Question	Answer
12.	Is plague vaccination available?	No.
13.	How many people die from plague?	a. Bubonic plague: 14 percent of treated persons die (50-60 percent of untreated persons die). b. Septicemic plague: 22 percent of treated persons die. c. Pneumonic plague: 57 percent of treated persons die.
14.	What is important to know about housekeeping for a person infected with the plague?	a. <u>Soiled clothing and linens</u> : Should be disinfected per standard precaution protocols. b. <u>Environmental surfaces</u> (beds, bedrails, beside equipment, and other frequently touched surfaces and equipment): Should be disinfected per standard precaution protocols.
15.	How should the cadavers of infected persons be handled?	a. Cadavers should be handled using standard precautions, including hand washing and gloves. b. Autopsy procedures likely to cause plague germs to be <i>sprayed or splattered into the air</i> , such as bone sawing, should be avoided.
16.	Where can I get more quality information on the plague?	1. http://www.bt.cdc.gov/agent/plague/index.asp 2. http://www.cdc.gov/ncidod/diseases/submenus/sub_plague.htm 3. http://www.bt.cdc.gov/Agent/Plague/ype_la_cp_121301.pdf 4. http://www.cdc.gov/ncidod/dvbid/plague/prevent.htm 5. http://www.cdc.gov/ncidod/dvbid/plague/bibliography.htm 6. http://www.cdc.gov/ncidod/dvbid/plague/who_cc/index.htm 7. http://www.vnh.org/MedAspChemBioWar/chapters/chapter_23.htm 8. http://www.who.int/emc-documents/surveillance/docs/whocdscsr2001.html/plague/plague.htm 9. http://www.who.int/emc-documents/plague/docs/whocdscsredc992a.pdf 10. http://www.who.int/library/historical/access/rare/index.en.shtml 11. Henderson DA, Inglesby TV, O’Toole T: Bioterrorism: <u>Guidelines for Medical and Public Health Management</u> . AMA Press 2002, pp 121-140. 12. Chin, J: <u>Control of Communicable Diseases Manual</u> . American Public Health Association 2000, pp 381-387.

Fig. 6 World Distribution of Plague, 1998

