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The Bubonic Plague
By: Matthew Morin and Ashton Westbrook

The Plague
Importance and Historical Circumstances
The bubonic plague is a very serious infectious disease caused by the bacterium *Yersinia pestis*. The plague is a zoonotic disease, which means it is usually transmitted to humans by animals. It is commonly transmitted through the bites of infected fleas or coming in direct contact with infected animal tissue (Schoenstadt, 2006). The bacterium can be found in fleas or small rodents such as chipmunks, squirrels, rats, or prairie dogs. The symptoms, including fever, chills, headache, and hemorrhages under the skin causing discoloration, are very harsh and unpleasant. This disease is infectious and extremely severe, and it is deadly if not treated properly and promptly (CDC, 2012).

Disease Classification
The Black Plague is a bacterium. This bacterium, *Yersinia pestis*, is obtained through a bite from an infected animal, inhaling of infected droplets, or coming in contact with infected body tissue. The bacteria can survive for a long time with a host, and can easily be transmitted airborne. This bacterium reproduces through binary fission, which is a common reproductive method for prokaryotes.

Bacterium Progression and Immune Response
Once *Yersinia pestis* enters the body, the bacterium travels to the proximal draining lymph nodes where it begins to grow and spread. At this point, the bacterium enters the bubonic stage of the disease. Between 48 and 72 hours later, the bacterium has colonized the blood, spleen, liver, and lymph nodes. The bacteria cannot be detected until the disease has entered advanced stages, which delays immune response. If the bacteria is not treated by an antibiotic, it will advance and become more and more deadly. The plague is fatal unless necessary actions are made.

The bubonic plague has the ability to surpass the first stages of immune response, making the disease deadly because it is already very advanced by the time the immune system begins working. Mammals first respond by releasing inflammatory cytokines that recruit phagocytic cells that engulf and destroy the bacteria, break it up into smaller pieces, and send those pieces to the T-cells and B-cells (University of Chicago Medicine, 2005). The T-cells and B-cells work more slowly, but are powerful and target specifically the smaller pieces of the infected cells.

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Mechanism of Antibiotic
The antibiotic that a patient is using is usually started when first symptoms appear, before any lab test results come back. The patient is hospitalized to ensure that proper treatment is administered and that the antibiotic is not spread to other people. Streptomycin, the most common antibiotic used to treat plague victims, is specifically for bacterial infections or diseases. Streptomycin slows the disease by slowing the synthesis of bacterial proteins.

Prognosis
The bubonic plague is a very severe and extreme disease. If left untreated, the victim will experience very painful and severe symptoms. The plague is rare, but it does occur. People today are fortunate enough to live in a time period where an effective antibiotic is available (CDC, 2012). If a patient is being treated for the bubonic plague properly, the death rate is very low at about 1-15%. If left untreated, the bacteria will continue to develop to more dangerous stages with higher death rates. Cases do not occur very often, especially in the United States.

Treatment
Options for treatment
When a person is diagnosed with the bubonic plague, they are immediately started on treatment—an antibiotic. People with whom infected persons have come in contact with are evaluated and are treated as well if they have become infected. The two most commonly used antibiotics when treating someone with the plague are Gentamicin and Streptomycin which are intramuscular or intravenous (Yas, Zieve, & Black, 1997). It is very important that proper treatment is administered because without it, the disease can advance and become more and more dangerous until it kills the host in as little as 24 hours. In addition to antibiotics, oxygen, intravenous fluids, and respiratory support are also usually helpful depending on how advanced the disease has become (Yas, Zieve, & Black, 1997). If the disease has developed to pneumonic plague, the patient will be isolated and kept away from others. Because the plague can sometimes be resistant to the antibiotics, the patient may have to take more than one type of antibiotic to effectively kill and get rid of the bacterium.

References available upon request.