Pneumococcus
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**Disease:** Pneumococcal  
**Etiologic Agent:** *Streptococcus Pneumoniae*(2).

**Transmission:** It’s spread through direct contact, person to person via respiratory droplets (3). The droplets from either coughing or sneezing of an infected person could then be spread to persons whom aren’t infected, but in close proximity of the infected.

**Reservoirs:** It’s a human pathogen, in the nasopharynx of infants, children, and rarely adults, or even those who are carriers of *Strep. Pneumoniae*. (1)

**General characteristics:** Streptococcus pneumoniae are gram-positive cocci, which are non-motile and encapsulated, found mainly in the upper respiratory tract of humans. The lancet-shaped cells range from 0.5 to 1.25 micrometers in diameter. These cells are usually seen as diplococci, but could appear singly and in short chains (1). They are alpha hemolytic when cultured on blood agar.

**Key tests for identification:** *Strep. Pneumoniae* can be identified by running a number of test, but a few of the main test include the optochin susceptibility test, bile solubility test, and a serotyping method. The optochin susceptibility test, tests strains of *Strep. pneumoniae* by incubating it overnight on a blood agar plate, in order to determine if it’s resistant or not. The bile solubility test was used to differentiate the disease from alpha-hemolytic. The serotyping method was determined by agglutination using specific antisera (8).

**Signs and symptoms:** When infected a person’s illness usually starts with fever. In bacterial pneumonia symptoms include rapid breathing or shortness of breath, cough producing bloody or green mucus, sharp chest pain, shaking chills and loss of appetite. In pneumococcal meningitis symptoms include stiff neck, confusion, headache, muscle pain. Also, in babies it causes low alertness, poor eating and drinking, as well as vomiting (7).

**History:**

- In 1881, the first discovery of *Strep. Pneumonia* occurred, when Louis Pasteur and George Sternberg identified the lancet-shaped cells in saliva.
- Late 1800s, Christian Gram used his cell wall staining technique, gram-staining in order to identify that the bacteria was gram-positive.
- Early 1900s, studies showed how *Strep. Pneumoniae* cell wall was encapsulated, also revealed how the bacteria’s physical structure determines its interaction with the immune system.
- During late 1800s and early 1900s, pneumonia was the leading cause of
death due to infectious disease and the third leading cause of death overall.

- By 1913, antipneumococcal serum therapy came about, in order to reduce the mortality rate.
- In the early 1940s, antibiotic penicillin was discovered.
- In 1977, pneumococcal polysaccharide vaccine (PPV), was discovered in order to protect against bacterial pneumonia, but it only protected against a limited Streptococcal serotypes.
- In 2000, pneumococcal conjugate vaccine (PCV), a second vaccine was discovered in order to protect against many more serotypes (5).

**Virulence factors:** The polysaccharide used to be considered the primary virulence factor of *Strep. Pneumoniae*, thus provided resistance to phagocytosis and promoted the escape of pneumococci from the host immune defense. However, there are now other factors, such as the cell wall and intracellular toxin pneumolysin involved mainly in inflammation caused by infections (6).

**Control/Prevention:** *Strep. Pneumoniae* is treated with antibiotics including penicillin, trimethoprim-sulfamethoxazole, cephalosporin, and tetracycline to name a few. Many of the bacteria are resistant to some of the antibiotics. In order to prevent the disease there are vaccines that should be given to children and those exposed to the infection, also those who travel. These vaccines include, PCV and PPV used to protect against or prevent illnesses (4).

**Outbreak cases locally and globally:** Before vaccines were discovered every year an estimated 826,000 deaths occurred worldwide in children under the age 5. Once vaccines were discovered in the year 2000 and later the second discovery in 2010, deaths declined dramatically. In the US, from 1998 to 2015, cases started to decline in children younger than age 5, from 100 cases per 100,000 people in 1998 to about 9 cases per 100,000 people in 2015. In adults from ages 19 to 65 cases declined from 1998 to 2015 decreasing from 16 cases per 100,000 people in 1998 to about 7 cases per 100,000 people in 2015(9). Globally, a large outbreak in Ghana between December 2015 and April 2016 was reported. Since then, there haven’t been many incidences reported. Also, in the dry season cases were ten times higher than in wet season (10).

**References:**


