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***Bordetella pertussis***

*B. pertussis* is a small, aerobic gram-negative rod. It is fastidious and requires special media for isolation . *B. pertussis* produces multiple antigenic and biologically active products, including pertussis toxin (PT), filamentous hemagglutinin (FHA), agglutinogens, adenylate cyclase, pertactin, and tracheal cytotoxin. These products are responsible for the clinical features of pertussis disease, and an immune response to one or more produces immunity following infection. Immunity following *B. pertussis* infection does not appear to be permanent.

**Pathogenesis**

Pertussis is primarily a toxin-mediated disease. The bacteria attach to the cilia of the respiratory epithelial cells, produce toxins that paralyze the cilia, and cause inflammation of the respiratory tract, which interferes with the clearing of pulmonary secretions. Pertussis antigens appear to allow the organism to evade host defenses, in that lymphocytosis is promoted but chemotaxis is impaired. Until recently it was thought that *B. pertussis* did not invade the tissues. However, recent studies have shown the bacteria to be present in alveolar macrophages.

**Pertussis Pathogenesis**

1. 1-Primarily a toxin-mediated disease
2. 2-Bacteria attach to cilia of respiratory epithelial cells
3. 3-Inflammation occurs which interferes with clearance of pulmonary secretions
4. 4-Pertussis antigens allow evasion of host defenses (lymphocytosis promoted but impaired chemotaxis)

**Clinical Features**

The incubation period of pertussis is commonly 7–10 days, with a range of 4–21 days, and rarely may be as long as 42 days. The clinical course of the illness is divided into three stages. The first stage, the catarrhal stage, is characterized by the insidious onset of coryza (runny nose), sneezing, low-grade fever, and a mild, occasional cough, similar to the common cold. The cough gradually becomes more severe, and after 1–2 weeks, the second, or paroxysmal stage, begins. Fever is generally minimal throughout the course of the illness. It is during the paroxysmal stage that the diagnosis of pertussis is usually suspected. Characteristically, the patient has bursts, or paroxysms, of numerous, rapid coughs, apparently due to difficulty expelling thick mucus from the tracheobronchial tree. In the convalescent stage, recovery is gradual. The cough becomes less paroxysmal and disappears in 2 to 3 weeks. However, paroxysms often recur with subsequent respiratory infections for many months after the onset of pertussis.common. though the disease may be milder in older persons, those who are infected may transmit the disease to other susceptible persons, including unimmunized or incompletely immunized infants.

**Pertussis Clinical Features**

1. 1-Incubation period 7-10 days (range 4-21 days)
2. 2-Insidious onset, similar to the common cold with nonspecific cough
3. 3-Fever usually minimal throughout course of illness Catarrhal stage 1-2 weeks
   1. 4-Paroxysmal cough stage 1-6 weeks Convalescence weeks to months
   2. **Laboratory Diagnosis**

The diagnosis of pertussis is based on a characteristic clinical history (cough for more than 2 weeks with whoop, paroxysms, or posttussive vomiting) as well as a variety of laboratory tests (culture, polymerase chain reaction [PCR], and serology). Culture is considered the gold standard laboratory test and is the most specific of the laboratory tests for pertussis. However, fastidious growth requirements make *B. pertussis* difficult to culture. The yield of culture can be affected by specimen collection, transportation, and isolation techniques. Specimens from the posterior nasopharynx, not the throat, should be obtained using Dacron® or calcium alginate (not cotton) swabs. Isolation rates are highest during the first 2 weeks of illness (catarrhal and early paroxysmal stages). Cultures are variably positive (30%–50%) and may take as long as 2 weeks, so results may be too late for clinical usefulness. Cultures are less likely to be positive if performed later in the course of illness (more than 2 weeks after cough onset) or on specimens from persons who have received antibiotics or have been vaccinated. Since adolescents and adults have often been coughing for several weeks before they seek medical attention, it is often too late for culture to be useful.

**Pertussis Laboratory Diagnosis**

1. 1-Culture – gold standard
   1. 2-Polymerase Chain Reaction (PCR) can confirm pertussis in an outbreak
   2. 3-highly sensitive
   3. 4-high false-positive rate
   4. 5-Serology can confirm illness late in the course of infection
   5. 6-many tests have unproven or unknown clinical accuracy
   6. 7-Direct fluorescent antibody test low sensitivity variable specificity
   7. 8-should not be used for laboratory confirmation
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