Lecture 9

Gram positive bacilli – *Corynebacterium diphtheria* .

Corynebacterium diphtheriae :is a gram-positive, non-motile, aerobic, and rod-shaped bacterium that causes diphtheria. is the most significant pathogen. There are four main subspecies .Diphtheria is an upper respiratory tract infection initially resulting in a sore throat and mild fever, but can progress to other more serious symptoms if not treated. Confirm identification by fermentation reactions :glucose positive ,Catalase positive, Urease negative.

Virulence factors

C. diphtheriae has two main virulence factors that contribute to its survival in the host. They help the process of adherence in the host and the colonization of the respiratory tract to cause infection.

Pili

The pili found on the surface of *C. diphtheriae* are beneficial in the adherence to host cells. There are three distinct types of pili expressed including SpaA, SpaD, and SpaH . The presence of these various pili on *C. diphtheriae* help it to adhere to certain surfaces, which is necessary for colonization of the host .

Toxin

The main virulence factor of *C. diphtheriae* is diphtheria toxin ,an exotoxin, released by the bacteria after entering the human body. Diphtheria toxin is classified as an AB toxin because it has two components, one for activation and one for binding. The major function of the toxin is to enter the cytoplasm and inhibit protein synthesis in susceptible host cells . The toxin is carried throughout the body via the bloodstream to reach distant organs, which can occasionally cause paralysis or congestive heart failure .

- Toxin consists of two fragments
  - A: Active fragment

- Inhibits protein synthesis
- Leads to cell/tissue death

- B: Binding
  - Binds to specific cell membrane receptors
  - Mediates entry of fragment A into cytoplasm of host cell

Sensitivity:

The bacterium is sensitive to the majority of antibiotics, such as the penicillins, ampicillin, cephalosporins.

Schick test:

The Schick test, invented between 1910 and 1911, is a test used to determine whether or not a person is susceptible to diphtheria. It was named after its inventor, Béla Schick .

The test is a simple procedure. A small amount (0.1 ml) of diphtheria toxin is injected intradermally into one arm of the person and a heat inactivated toxin on the other as a control. If a person does not have enough antibodies to fight it off, the skin around the injection will become red and swollen, indicating a positive result. This swelling disappears after a few days. If the person has an immunity, then little or no swelling and redness will occur, indicating a negative result.

Diphtheria antitoxin

is a medication made up of antibodies used in the treatment of diphtheria. It is given by injection into a vein or muscle. Diphtheria antitoxin was developed and came into medical use in the late 1800. Side effects are common. They include allergic reactions. Diphtheria antitoxin is made from the blood plasma of horses that have been immunized against diphtheria toxin.