Infection

The multiplication of a microorganism in or on the tissues of a host constitutes infection. It does not invariably result in disease.

Infections may be classified in various ways:

1. **Primary infection:** Initial infection with a microorganism in a host is termed primary infection.
2. **Reinfection:** Subsequent infections by the same microorganism in the host are termed reinfection.
3. **Secondary infection:** When a new microorganism sets up an infection in a host whose resistance is lowered by a preexisting infectious disease.

Sources of infection

A. Human
B. Animals
C. Insects
D. Soil and water
E. Food.

A-Humans serving as the microbial reservoir:

1. Acquisition of "strep" throat through touching
2. Gonorrhea, and syphilis by sexual contact
3. Tuberculosis by coughing; and the common cold through sneezing.

B-Animals :Zoonosis: The diseases and infections, which are transmissible to man from animals are called *zoonosis*.

C-Insects: Arthropod-borne Diseases

Blood-sucking insects, such as mosquitos, ticks, mites, flies, and lice may transmit pathogens to human beings and diseases so caused are called arthropod borne diseases.

D. Soil and water : *Spores of tetanus and gas gangrene:* Spores of tetanus and gas gangrene remain viable in the soil for several decades and serve as source of infection.
Water may act as the source of infection either due to contamination with pathogenic microorganisms (*Shigella*, *Salmonella*, *Vibrio cholerae*).

E. Food: Contaminated food may act as source of infection of organisms causing food poisoning, gastroenteritits, diarrhea and dysentery.

Virulence: The term virulence denotes the ability of a strain of a species to produce disease. For example, encapsulated *pneumococci* are more virulent than non-encapsulated *pneumococci.*

Toxigenicity : Some bacteria cause disease by producing toxins, of which there are two general types: The exotoxins and the endotoxins **(Table 11.1)**.

Table 11.1 Differences between exotoxins and endotoxins

Exotoxins	Endotoxins
1. Proteins	1. Lipopolysaccharide on outer membrane. Lipid A portion is toxic
2. Heat-labile. (inactivated at 60°–80°C)	2. Heat-stable
3. Actively secreted by the cells; diffuse into the surrounding medium	3. Form integral part of the cell wall; do not diffuse into surrounding medium
4. Readily separable from cultures by physical means, such as filtration	4. Obtained only by cell lysis
5. Action often enzymatic	5. No enzymatic action
6. Specific pharmacological effect for each exotoxin	6. Nonspecific action of all endotoxins
7. Specific tissue affinities	7. No Specific tissue affinities
8. Highly toxic and fatal in microgram quantities	8. Moderate toxicity. Active only in very large doses
9. Highly antigenic	9. Weakly antigenic
10. Action specifically neutralized by antibody	10. Neutralization by antibody ineffective
11. Usually do not produce fever	11. Usually produce fever by release of interleukin-1
12. Produced by both gram-positive bacteria and gram-negative bacteria	12. Produced by gram-negative bacteria only
13. Frequently controlled by extrachromosomal genes (e.g. plasmids)	13. Synthesized directly by chromosomal genes
14. Disease examples-Botulism diphtheria tetanus	14. Gram-negative infections, meningococcemia

Enzymes:

enzymes that play important roles in the infection process.

1.Coagulase: Coagulase is produced by *Staphylococcus. aureus.* This thrombin-like enzyme prevents phagocytosis by forming a fibrin barrier around the bacteria and walling off the lesion.

2. Lecithinase-C and collagenase: *Clostridium perfringens* produces lecithinase-C and collagenase promoting spread of infection in tissue.

3. Hyaluronidases*:* Hyaluronidases split hyaluronic acid and thus facilitate the spread of infection along tissue spaces, e.g. Streptococcus.

4. Streptokinase (fibrinolysin): Many haemolytic streptococci produce streptokinase (fibrinolysin) which promotes the spread of infections.

5. Cytolysins: These include hemolysins capable of destroying erythrocytes and leukocidins damage polymorphonuclear leukocytes.

6. IgA 1 proteases: These enzymes specifically cleave immunoglobulin IgA which protects at mucosal surfaces.