



## Microbial virulence

Small percentage of M.O.s cause disease. To cause disease a pathogen must be able to :

- 1-Attach to and gain entrance into a susceptible host
- 2- Multiply in host tissues .
- 3-Resist or not provoke host defenses .
- 4-Damage the host, often by the secretion of toxins .

Given suitable environmental conditions and susceptible host, most organisms will exhibit disease producing potential .

**Virulence refers to a pathogen's capacity to cause disease. It depends on properties of the organism such as :**

- 1-Invasiveness.
- 2- Ability to survive and reproduce in the presence of the host's defense mechanism
- 3- toxin production .

**\*Invasiveness:** Three terms used to express the invasiveness of pathogens with respect to the blood stream are :

- 1-Bacteremia: the laboratory demonstration of bacteria in blood samples .
- 2-Septicemia: The presence of organisms in the blood and their association with toxic symptoms of the host .
- 3-Pyemia: The production by pathogens of localized collections of pus in host tissues (pus-forming organisms in the blood) .

Relatively non-toxic bacterial structures and products contributing to Invasiveness. Invasiveness: Refers to organism's abilities to survive and to establish itself in host tissues .

Obstacles faced by pathogens include [phagocytosis](#), the [destructive action of serum](#) upon gram negative bacteria, and [difficulty in spreading through tissues](#) .

Bacterial structures and products which can help pathogens to overcome host obstacles include; **Capsules**, **Enzymes** Like ,[coagulase](#), [hyaluronidase](#), [streptokinase](#) .

### **Microbial Toxin Production:**

1- Bacterial toxins are categorized as either endotoxins or exotoxins .

Endotoxins are associated with gram negative bacteria ,Lipopolysaccharide-protein complexes .

Exotoxins are; secreted during the growth of bacteria or upon the autolysis of cells, Protein in nature, Associated with gram +ve bacteria such as botulism, diphtheria, gas-gangrene, scarlet fever, staphylococcal food poisoning, and tetanus .

2-Algal toxins: many algal toxins have been found to be poisonous to fish, waterfowl, and clams .

3-Mycotoxins: ingestion of foods contaminated with fungus toxins can cause disease called Mycotoxicosis.

Properties of mycotoxicosis include [Non-transmissibility](#), [Ineffectiveness of drug or antibiotic treatment](#), Association of outbreaks with a specific food item, Seasonality of outbreaks .Demonstrated fungal activity in the suspected food .

Mycotoxins produced by *Aspergillus* species the **aflatoxins** are the best known. Some mycotoxins also show; Antibacterial, Antifungal , Antiprotozoan , Antitumor effects. Some also are carcinogenic.

## Viral Pathogenicity :

Many microbial pathogens are **intracellular parasites**. The establishment of a virus disease process depends not only on the host's defenses, but on the pathogen's ability to counteract them, and on the number of invading organisms. The pathological effects of viruses:

**1-** Cellular damage of host tissues .

**2-** Viral replication can occur in cells without damage like cold sores and fever blisters .

Some slowly developing, persistent diseases that do not appear to be infectious can be caused by 'Unusual Slow' viruses. For example: severe neurological diseases may be caused by such agents .

Viruses cytotoxic activity can operate at **two levels** ;

**A-** Biochemical injury with out cellular damage .

**B-** Biochemical injury with cellular damage (e.g. Cell destruction, Fusion or death) .

Cellular damage is usually referred to as a cytopathic effect .

## Opportunists and True Pathogens

Opportunists are organisms that have the potential to produce infections but do not have the capacity to directly invade the tissues of the host opportunists may or may not be members of hosts normal flora .

Several situations may contribute to the establishment of infections caused by opportunists. These include ;

**1-** Genetic host defects .

**2-** Use of antibiotics .

**3-** Use of immunosuppressive therapy .

