

Host-Parasite Relationship

- The human host is regularly in contact with microorganisms but only a few of these are able to establish themselves within the host tissues.
- When a microorganism tries to establish itself in its host, the host responds by assembling a series of defence mechanisms.
- **Resistance:** ability of the host to prevent establishment of infection through defence mechanisms
- **Susceptibility:** talk of this ability

Host resistance to parasite invasion is divided:

- a) Non specific resistance – This depends on natural resistance that is part of constitution of host.
- b) Specific /acquired resistance – Immunity and concern defence mechanisms that have developed in response to a specific or particular microorganism.

When the lines of defence are unable to contain the infection the specific acquired mechanisms are called into action

- Antimicrobial agents may also be used to help host clear the infection.

Host resistance to parasite invasion is divided:

- I. Pathogenicity and
- II. Normal Flora

Determinants of Pathogenicity:

- 1) Ability to survive host's natural defence mechanisms
- 2) Ability to multiply to large numbers
- 3) Adherence: ability for microorganism to be able to attach firmly to host's epithelial surface so that they are not easily dislodged (Removed).

- Bacteria attach to cells by chemical substances on their cell surface called **ADHESINS**. The receptors on host cells surfaces include **FIBRONECTIN**.

Adhesins may be (i) **Pilli**

(ii) **Capsules**

- Adherence facilitates colonization & subsequent penetration of epithelia.

4) **Tissue Destruction:** ability to overcome defences, invade, destroy to produce clinical disease.

Note:

- a) Infection is simply invasion of cells and multiplication by organisms without tissue destruction.
- b) Virulence is an ability to invade and destroy tissue to produce disease.
- c) When the organism is able to produce disease even in an apparently healthy host it is referred to as **PRIMARY PATHOGEN** but when it causes disease only when the host's defences are impaired, it is called **SECONDARY PATHOGEN** (Opportunistic pathogen)

Tissue Destruction Accomplished by Either:

a) Toxin production

- Exotoxin (for characteristics ref. Table)
- Endotoxin

b) Invasiveness invasive organism may be:

- i) Capsulated or
- ii) Non capsulated

Capsulated organisms resist phagocytosis but once ingested they are readily digested (and killed) within the phagocyte. Therefore referred to as **EXTRACELLULAR** organisms e.g. *S.pneumoniae*

Non capsulated organisms are easily phagocytosed but relatively resistant to digestion within phagocyte and survive and multiply within phagocyte until phagocyte is killed and are called **INTRACELLULAR** organisms e.g. *M.tb.*

Transmissibility:

- Ability to spread from one host to another. This enables microorganisms to maintain continuity of its species in the event of death of original host.

Koch's Postulates:

For a microorganism to be accepted as the cause of an infectious disease it must satisfy all or most of these criteria.

- 1) The organism must be found in all cases of the disease and its distribution in the body must correspond to that of the lesions observed in the host.
- 2) The organism should be cultured in pure culture in all cases of the disease.
N.B.: Some organisms are yet to be cultured in the lab e.g. *Treponema pallidum*.
- 3) The organisms should reproduce the disease in other susceptible animal hosts.
- 4) Antibodies to the disease usually develop in the course of the disease.

Exotoxin Vrs. Endotoxin

Exotoxin	Endotoxin
1- Protein	Lipopolysaccharide
2- Soluble & Diffusible	Part of cell wall
3- Heat Labile	Heat stable
4- Pharmacologically specific action	Non-Specific
5- High Immunogenicity	Low Immunogenicity
6- Inactivated by Chemicals to toxoids	Do not form toxoids
7- No Fever	Induce Fever

Normal Flora

Definition:

These are microorganisms that are frequently found on /within the body of a healthy person. Some of these microorganisms are found in association with humans/animals only. Others are found in the environment as well. Vast majority of normal flora are bacteria

1) May be source of opportunistic infections e.g. in patients with impaired defence mechanisms.

2) Immunostimulation:

- a) They produce antibodies which may contribute to host defences.
- b) Some of these antibodies may crossreact with normal tissue components e.g. the antibodies to the various ABO groups arise because of cross reaction between the intestinal flora and the antigens of A & B blood substances.

Normal Flora (Continued)

3) Protection from External invaders.

4) Nutrition

Some of the normal intestinal flora e.g. *E.coli* & *Bacteroides* produce Vitamin K in the gut which is available for use by host.

5) Production of Carcinogens

Areas of the body with Normal Flora

A) Gastrointestinal tract

i) Mouth

ii) Large colon

B) Urogenital tract

i) Vagina

ii) Distal 1/3 of the urethra

C) Skin