

Pathogenic Microorganisms

3rd Class Module

Lecture

Introduction to Pathogenic Microorganisms

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Introduction:

- Microorganism capable of injuring its host by competing with it for metabolic resources, secreting toxins or destroying its cells or tissues. The injurious microorganisms include viruses, bacteria, mycobacteria, fungi, protozoa.
- Pathogenic microorganisms may be carried from one host to another. Some organisms are pathogenic for animals as well as humans and may be communicated to humans through direct or indirect contact.
- Pathogenic organism is an organism capable of causing disease in its host.
- A human pathogen is capable of causing illness in humans.
- Pathogenicity is the capacity of a microorganism to cause a disease.
- The diseases caused by pathogenic bacteria are generally called infections.
- Pathogenic bacteria possess several genes that endow the capacity to cause diseases.

Terms you have to Know

Pathogenicity:

- The ability of micro-organisms to induce disease, which may be assessed by disease-carriage ratios.

Virulence:

- The severity of the disease induced by micro-organisms. In epidemiological studies virulence may be assessed by mortality or morbidity rates and the degree of communicability.

Reservoir:

- The place where the organism maintains its presence, metabolizes, and replicates.

Source:

- The place from which the infectious agent passes to the host. In some cases the reservoir and the source are the same, but not always.

Infection:

- A microbiologically proven clinical diagnosis of inflammation.

Carriage:

- Permanent (minimally 1 week) presence of the same strain in any concentration in body sites normally not sterile (oropharynx, external nares, gut, vagina, skin).

Abnormal carrier state:

- The abnormal carrier state exists when the isolated micro-organisms is not a constituent of normal flora (i.e., enterobacterial or pseudomonas strains).

Colonization:

- The presence of micro-organisms in an internal organ that is normally sterile (e.g., lower airways, bladder). The diagnostic sample yields less than a predetermined level of cfu/ml of diagnostic sample.

Factors that determine the Pathogenicity of Bacteria

- Host susceptibility

Presence of mechanisms to fight with the infection by the host immune system.

- Pathogenic mechanisms of bacteria

Bacterial infectivity, host resistance, virulence genes, host- mediated pathogenesis and intracellular growth

- Specific virulence factors

Adherence and colonization factors, invasion factors, presence of a capsule and other surface components, endotoxins, exotoxins, and siderophores

Infection and disease

Depending on the relationship of microbes with respect to humans, they may be divided into 2 broad groups:

1. Free living: microbes living in natural habitat such as soil & water. E.g. *P.aeruginosa*, *B.subtilis*, *Clostridium*, *Actinomyces* and *Micrococcus*.

Or

Saprophyte : bacteria living on dead and decaying organic matter. Majority of free living organisms are saprophytes.

2- Parasitic: an organism which lives on a living host and derives nutrition from it, without any benefit to the host.

- Commensals: which live in complete harmony with the host without causing any harm to it. They constitute the normal bacterial flora of the body. For eg *S.epidermidis* and *E.coli*.
- Pathogen : microorganism capable of producing disease in host.
- Opportunistic pathogen: pathogen produce disease when body resistance is lowered.
- Virulence : degree of pathogenicity of a microbe.

Classification of infection:

- Primary infection: initial infection with a parasite in a host
- Reinfection : subsequent infection with the same parasite in the same host.
- Secondary infection: When body resistance is lowered by a pre existing disease, a new infection via new parasite.

- Focal Infection: When due to localised infection generalised effects are produced.
- Cross infection: when a patient already suffering from a disease acquires new infection from another host.
- Nosocomial infection: cross infection acquired in hospitals.
- Subclinical infection: when clinical symptoms an infection are not apparent.
- Iatrogenic infection: physician induced infection resulting from drug therapy or investigative procedures.