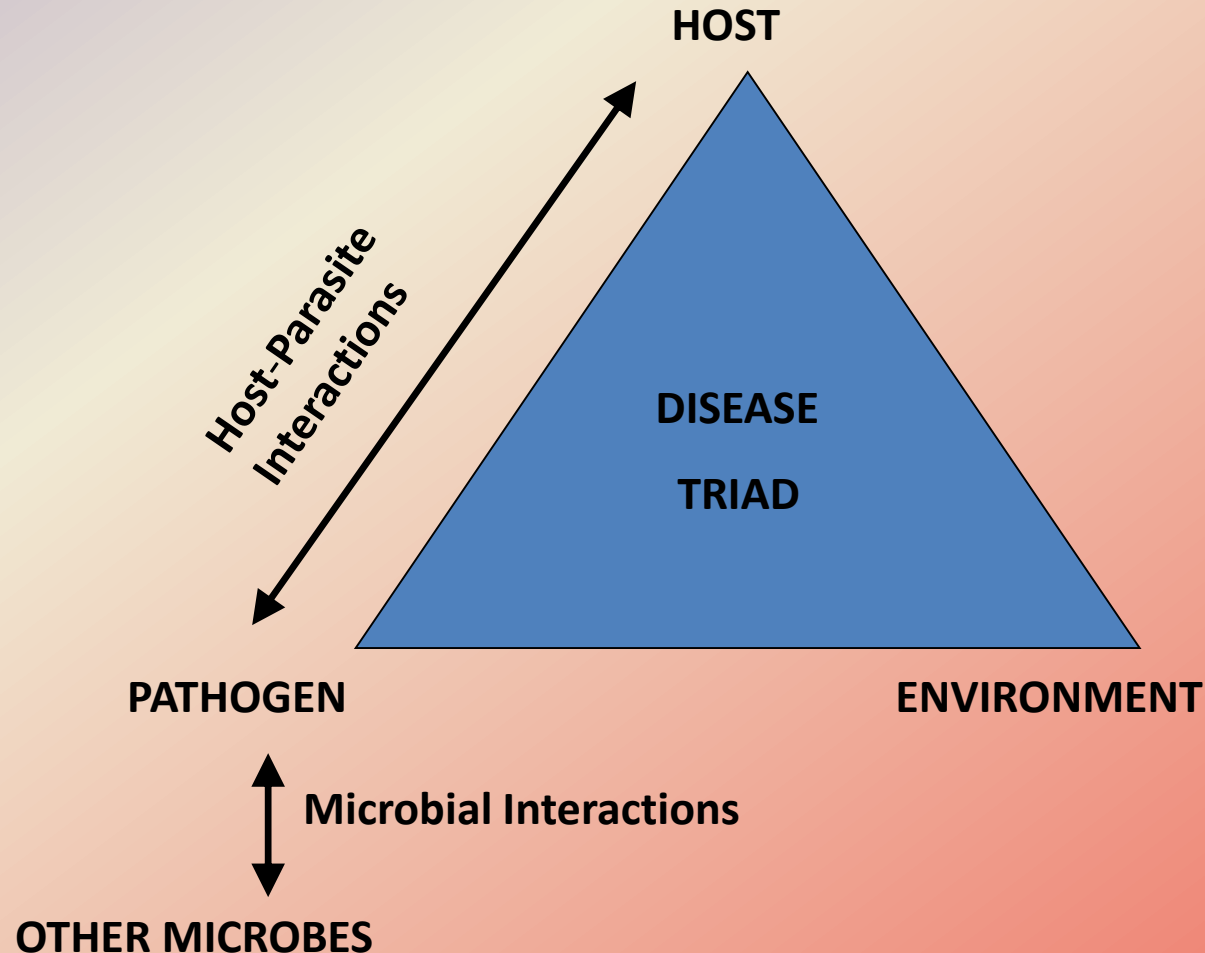




Pathogenicity of Infectious Diseases

Pathogenicity of Infectious Diseases



KOCH'S POSTULATES

Four criteria that were established by Robert Koch to identify the **causative agent of a particular disease**, these include:

1. The microorganism (pathogen) must be **present in all cases of the disease**
2. The pathogen can be **isolated** from the diseased host **and grown in pure culture**
3. The pathogen from the pure culture must cause the **same disease when inoculated** into a healthy, susceptible laboratory animal
4. The pathogen must be **reisolated** from the new host and **shown to be the same** as the originally inoculated pathogen

PATHOGENICITY vs. VIRULENCE

PATHOGENICITY

The pathogenesis of bacterial infection includes the initiation of the infectious process and the mechanisms leading to the development of signs and symptoms of bacterial disease

The pathogenicity of pathogen is related to :

1. Invasiveness
2. virulent
3. Number of pathogen
4. Mutation (variability)

Terms related to pathogenicity

Infectivity:

- Ability of agent to cause infection
- Number of infectious particles required
- In person-to-person transmission, secondary attack rate is a measure of infectivity

Virulence:

- Severity of the disease after infection occurs
- Measured by case fatality rate or proportion of clinical cases that develop severe disease

e.g. Shigellosis Vs salmonellosis.

Terms related to pathogenicity

Toxigenicity

The ability of a microorganism to produce a toxin that contributes to the development of disease

Invasion

The process whereby bacteria, parasites, fungi and viruses enter the host cells or tissues and spread in the body

Terms related to pathogenicity

Pathogen

Non-pathogen

Opportunistic pathogen

Factors Influencing Disease

Agent

- Infectivity
- Pathogenicity
- Virulence
- Immunogenicity
- Antigenic stability
- Survival

Environment

- Weather
- Housing
- Geography
- Occupational setting
- Air quality
- Food

Host

- Age
- Sex
- Genotype (race)
- Occupation
- Nutritional status
- Health status (immune status)

Infection and Immunity

Manifestations of infectious process (Infection spectrum):

- 1) Clearance of pathogen (no infection)
- 2) Covert infection (subclinical infection)
- 3) Overt infection (Clinical infection or apparent infection)
- 4) Carrier states

- ✕ Health carrier after covert infection.
- ✕ Convalescent carrier after overt infection.
- ✕ Incubatory carrier before onset of disease.

According to carrier time : #acute (transient) carrier

#chronic carrier

- 5) Latent infection.

Definitions

- **Disease:**

An abnormal condition of a part, organ, or system of an organism resulting from various causes such as infection, inflammation, environmental factors, or genetic defect and characterized by an identifiable group of signs, symptoms, or both

- **Infection:**

The invasion and multiplication of microorganisms such as bacteria, viruses, and parasites that are not normally present within the body. An infection may cause no symptoms and be subclinical, or it may cause symptoms and be clinically apparent

Classification of infectious diseases

By duration

- **Acute** – develops and runs its course quickly
 - Common cold
- **Chronic** – develops more slowly and is usually less severe, may last for a long indefinite period of time
 - Tuberculosis
- **Latent** – periods of no symptoms between outbreaks of illness
 - Herpes zoster (cold sores)

Classification of infectious diseases

By location

Local — Localized in a specific area of the body

Systemic — generalized infection affecting most tissues

By timing

Primary — initial infection in a previously healthy person

Secondary — infection that occurs because of weakened immune system caused by another infection

Manifestations of disease

Symptoms

Subjective characteristics of disease felt only by the patient

Signs

Objective manifestations of disease observed or measured by others

Syndrome

Symptoms and signs that characterize a disease or abnormal condition

Asymptomatic (subclinical)

Infections lack typical symptoms of the disease but may still have signs of infection

Characteristics of Pathogenic Bacteria

1. Transmissibility
2. Adherence to host cells
3. Invasion of host cells and tissue
4. Evasion of the host immune system
5. Toxigenicity

Pathogenetic Mechanisms

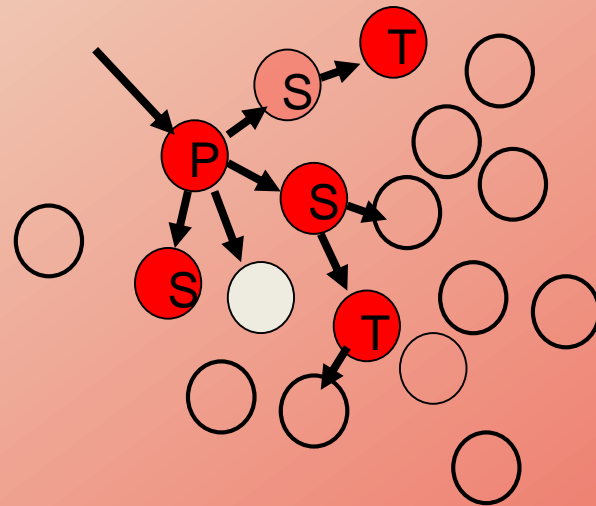
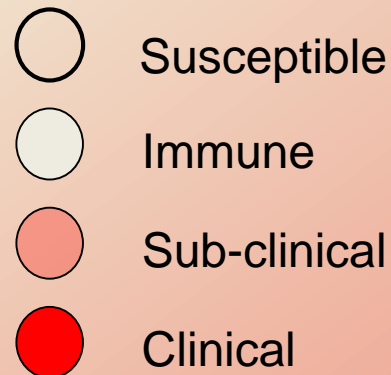
- Direct tissue invasion
- Production of a toxin: anthrax produce toxins that invade and destroy tissue
- Immunologic enhancement or allergic reaction
- Persistent or latent infection
- Enhancement of host susceptibility to drugs
- Immune suppression

Infectious Diseases

Transmission

Cases

- ⚙ Index – the first case identified
- ⚙ Primary – the case that brings the infection into a population
- ⚙ Secondary – infected by a primary case
- ⚙ Tertiary – infected by a secondary case



Infectious Diseases

Incubation period

- Time between exposure and onset of symptoms or signs of infection.
- Each disease has typical incubation period but varies widely.
- Requires replication of the organism to some threshold level for producing symptoms

Infectious Diseases

Common symptoms and signs

- Fever
- Rash eruption
- Toxemic symptoms
- Mononuclear phagocyte system reactions
 - Hepato-splenomegale
 - Lymphonodus enlarged
- Clinical types

Diagnosis of infectious diseases

- Epidemiological dates
- Clinical features
 - Symptoms and signs
- Laboratory findings
 - Routine examination of blood, urine, feces
 - Bio-chemical examinations
 - Etiological examinations
 1. Direct exam
 2. Isolation of pathogen
 - Molecular biological examinations
 - Immunological examinations
 - Endoscope examinations
 - Image examinations

Treatment of infectious disease

- General and supporting therapy
 - Isolation of patients, rest, diet, nursing
- Pathogen or specific therapy
- Symptomatic therapy
- Rehabilitation
 - Physiotherapy acupuncture
- Chinese herbs or tradition medicine

Prevention of infectious disease

- Management of source of infection

- Cut off of route

Personal hygiene, public hygiene, insecticide, disinfection

- Protect susceptible population

Active immunization

Passive immunization