Epidemiology .5

The Host : a person or other living animal including birds and arthropods that afford maintainance, survival or lodgment on inf. agent.

* 4 stages that descripeed in **succesful parasitism** :

1. The inf. agent must find a portal of entry to the host (respiratory tract, alimentary tract, GU tract, skin)
   - ↳ some organism may have more than one (ex: HBV, Q fever, Brucellosis)
2. on gaining entry into the host, the organism must reach the appropriate tissue (Site of ellection) tropism → where it find optimum condition for its multipication and development.
3. The inf. agent must find a way out of the body (Portal of exit) in order to reach new host and propagate its species
   - ↳ if there is no portal of exit, the infection become a dead-end infection as in (rabies, bubonic plague, tetanus, trichinosis)
4. After leaving the host, the organism must survive in the external environment for sufficient period until find new host.

note

- a successful diseuse agent shouldn't cause the death for the host but produce a low grade immunity → so the host is vulnerable again to the same infection (the best example is common cold)

Incubation Period (IP) : - The time interval between invasion by inf. agent and apperance of the first sign or syptoms of the diseuse in question.

During incubation period → multiplication of inf. agent until sufficient density is built up in the host

↓ then

the health equilibrium is distrubted and the disease become overt.

* Factor that determine the incubation Period:

1. The generation time (time takes bacteria to divide usually hours to days)
2. infective dose.
3. Portal of entry
4. individual susceptibility.

⇒ Median length of (IP) →
- from (10 days — 3 weeks) ex: • Typhoid • measles • chicken pox • mumps
- from weeks to months to years
- some difficult to measure precisely
  ex: • HAV, HBV • Rabies • leprosy • slow virus diseases

Serial interval : Gap in time between the onset of the primary case and the secondary cases

ex. the outbreak of disease in a family (small group), there is initial primary case followed by 2,3 secondary within short time.

Communicable period : The time during which an inf. agent may be transferred directly or indirectly from an infected (person to person, person to animal or animal to person)

→ varies in different disease

→ some disease more communicable during the incubation period that during actual illness.

→ early diagnosis and treatment can reduce the communicability

Secondary attack rate (SAR) : number of exposed person (to primary case) developing the disease within the range of the incubation period.

- Host defense against infection: - local and systemic.
  - cellular and humeral.
  - specific and non-specific.

note : It is difficult to identify any inf. agent that fails to stimulate multiple host defense mechanism.

Resistance : total body mechanism which act as barriers to invasion or multipication of organism or their toxins damaging effect.

- Natural barriers (Inherent resistance, innate immunity)
- Acquired resistance (immunity)
  - Passive immunity
    - Natural
    - Artificial
  - Active immunity
    - Natural
    - Artificial

- **Natural resistance**
  - non specific resistance against invading organisms.
  - doesn't depend on the presence of specific Ab or anti-toxin
  - depend on the anatomical and physiological characteristic of the host.

→ include natural defensive mechanism:
- body surface
- phagocyte in tissue
- Blood

Acquired immunity

Passive immunity : Type of resistance in which ready made Ab are gained

- Natural : Ab from mother
- Artificial : injecting immune serum or immunoglobulin.

① Natural Passive immunity (infant immunity)

ⓐ Due to Ab passed to the fetus through the Placenta

- The mother should have acquired the infection or vaccine to develop Ab.

- They are at the highest level at birth and decline gradually till dissaperance by 6 month

- can be induced by immunizing the mother during pregnancy. (ex: tetanus toxoid to protect infant agains tetanus neonatorum).

ⓑ Breast milk

- specially colostrums (95% of colostrums proteins is Ab)
- Ab continuosly secreted in breast milk but lower than colostrums

② Artificial passive immunity (passive immunization, immunoprophylaxis)

- injecting immune serum or Ig.
- short duration (about 3weeks), during which Ab gradully eliminated.

ⓐ Sera of artifially immunized animal

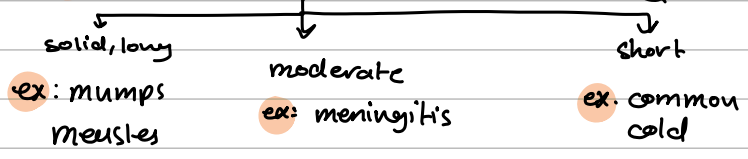
- used for prophylaxis or treatment as anti-toxins or anti-diphtheric.

ⓑ Immunoglobulin:

- plasma protein fraction contain most of Ab used as prophylaxis in HAV.

Active immunity : type of resistance in which the Person makes his own Ab.

① Natural active - post infection immunity



② Artificial active - post vaccination immunity

- where the specific antigen when introduce in the body provoke (induce) Ab formation.

Ideal immunizing agent:

1. minimal side effect
2. antigenic stability
3. Durable immunity
4. easy administration
5. Few injections
6. Reasonable cost
7. Availability
8. Good keeping quality (long shelf life)
9. easy storage

Herd Immunity

- the state of immunity within the community.
- the factor that decide the epidemiological pattern of any infectious disease among the community.

- herd immunity theory: it's hard to maintain an infection when large number of population are immune.

↳ it provide immunological barrier against the spread of disease.

⇒ The higher the number of immune individual, the lower the likelihood that a susceptible person will come in contact with an inf. agent.

- low or no immunity → ↑ attach and case fatality rate. (involving all susceptible)
- The disease incidence rise when
  - the highest the number of susceptible in population.
  - the lowest the herd immunity.

⇒ the epidemic wave decline with build up of herd immunity following natural infection.

Herd immunity result from

1. epidemic
2. obligatory immunization schedule

→ herd immunity can be determined by serological survey (serological epidemiology)

Community protection governed by:

1. extent of coverage of immunization program
2. degree of resistance to infection afforded by the vaccine.
3. duration and degree of infectivity of the organism
4. Past experience with different infections
5. overcrowding and environmental sanitation