

## ■ High-Yield Summary – Susceptible Host, Incubation, Communicability, Immunity & Herd Immunity

### 1. Susceptible Host

A host is any person or living animal (including birds & arthropods) that allows maintenance, survival, or multiplication of an infectious agent under natural conditions.

### 2. Successful Parasitism – Four Essential Stages

1. Portal of Entry – respiratory, alimentary, genitourinary tract, skin; some organisms have multiple portals (HBV, brucellosis).
2. Tropism – pathogen must reach the tissue where it multiplies best.
3. Portal of Exit – required for transmission to new hosts; if absent → dead-end infection (rabies, tetanus, bubonic plague).
4. Environmental Survival – organism must survive outside long enough to reach a new host.

Ideal pathogens do not kill the host quickly and often produce low-grade immunity (common cold virus).

### 3. Incubation Period

Time between exposure and first symptoms. Pathogen multiplies until it disturbs health equilibrium.

Determined by generation time, infective dose, portal of entry, host susceptibility.

Ranges: 10 days–3 weeks (typhoid, measles), long (months–years: hepatitis A/B, rabies, leprosy).

### 4. Serial Interval

Time between onset in primary case and onset in secondary cases. Helps estimate incubation period.

## 5. Communicable Period

Time during which pathogen can be transmitted.

Some diseases transmit during incubation. Communicability reduced by early diagnosis/treatment.

Secondary Attack Rate = number of exposed developing disease within one incubation period.

## 6. Host Defences

Local/systemic, specific/non-specific, humoral/cellular.

### A. Inherent (Innate) Resistance

Non-specific, does not depend on antibodies. Includes body surfaces, phagocytes, blood components.

### B. Acquired Immunity

Includes passive and active immunity.

## 7. Passive Immunity

**Natural Passive:** maternal IgG via placenta (highest at birth, gone by 6 months); colostrum rich in antibodies.

**Artificial Passive:** immune serum or immunoglobulin; rapid but short ( $\approx 3$  weeks). Examples: anti-tetanus, anti-diphtheria, Hep A immunoglobulin.

## 8. Active Immunity

**Natural Active:** after infection; duration varies (measles long, meningitis moderate, cold short).

**Artificial Active:** post-vaccination; antigen stimulates antibody formation.

## 9. Criteria of Ideal Immunizing Agent

Minimal side effects, antigenic stability, long immunity, easy administration, few doses, low cost, good shelf life, easy storage.

## 10. Herd Immunity

Population immunity level that prevents disease spread.

High immunity → pathogen cannot find susceptible hosts.

Outbreaks occur when herd immunity drops.

Results from epidemics or vaccination programs.

Measured through serological surveys.

### Determinants:

Immunization coverage, vaccine effectiveness, infectivity duration, previous outbreak patterns, overcrowding & sanitation.