Causation & Natural History Of Disease

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Road traffic Accidents per year

Highway	Within the city
• 500 accidents • 30% accidents are fatal • 60% accidents – victim required major surgery • Majority --Time- 3 a.m. to 6 a.m	• 2000 accidents • 2% accidents are fatal • 10% accidents required major surgery • Majority-Time- 10 a.m. to 12 noon and 6 p.m. to 8 p.m • Fatal accidents- • 12 night-1am- on cross roads--

Theory/Models Of Disease Causation

Theory

- Germ Theory Of Disease
- Theory Of Multi factorial Causation

Model

- Epidemiological Triad
- Web Of Causation

Natural History Of Disease

Out come of disease

Regress spontaneously,
leading to recovery

Relapses or
Temporary /Permanent Disability

Progress to a fatal termination

The **natural history of disease**

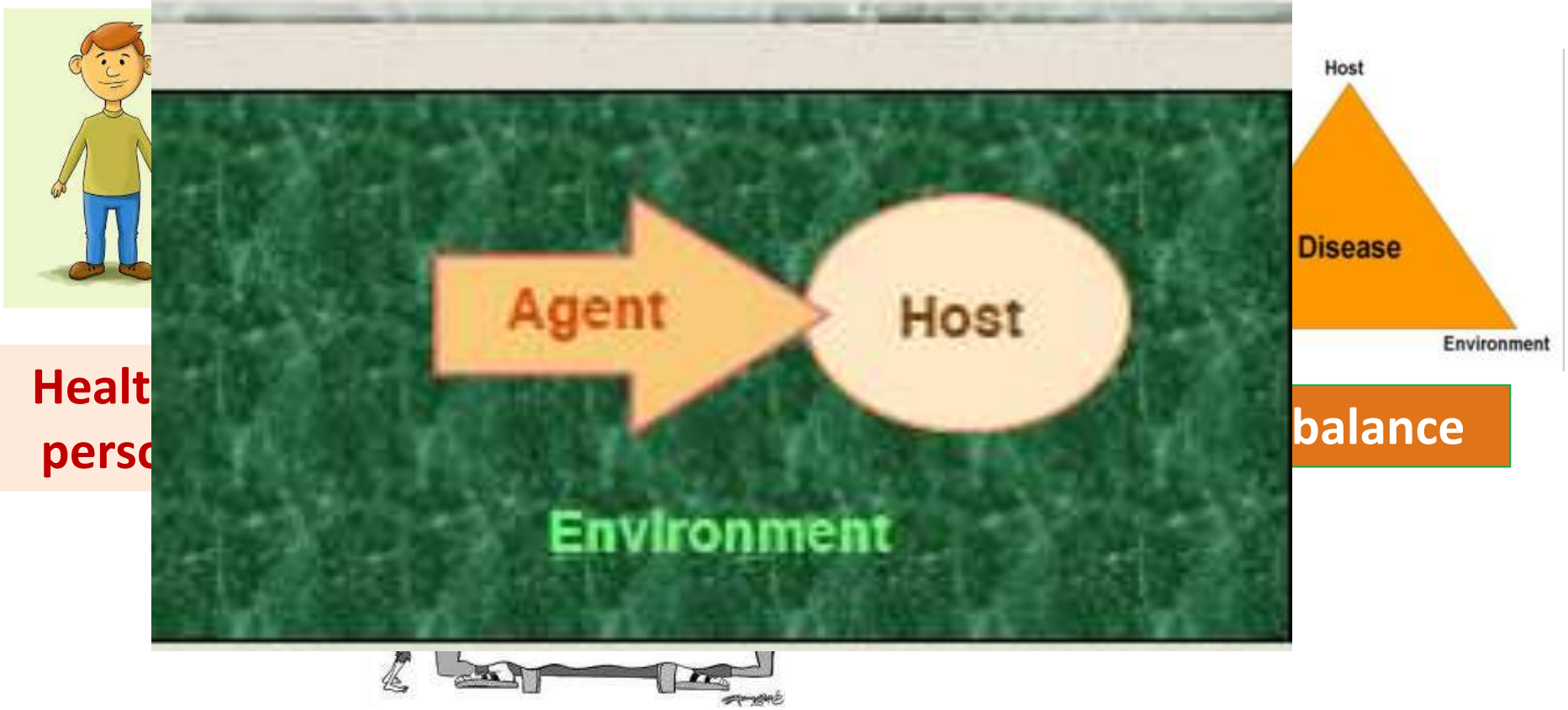
The Natural history of disease refers to the sequence of events that happen one after another over a period of time in an individual from the moment of exposure to causal agents/risk factors until recovery or death, in a person who is not receiving treatment.

Natural History Of Disease

1.Pre pathogenic Phase

2.Pathogenic Phase

Natural History Of Disease



Healt
perso

balance

1. Pre-Pathogenesis Phase / Stage of susceptibility

The disease has **not developed** but the ground has been laid by the presence of factors that favor its occurrence.

For example,

- loss of Immunity
- Poor hygiene for infectious disease
- High Cholesterol, obesity, Type of personality: Heart Diseases
- Radiation, Smoking, Immune suppression: Cancer.

Risk Factor

Smoking is a risk factor for IHD

- Smoking the risk of developing IHD by about two times

- Many smokers may never develop IHD while many non-smokers may develop the same.

Risk Factor

It defined as a condition, quality or attribute, the presence of which increases the chances of an individual to have, develop or be adversely affected by a disease process.

Risk Factor

•A risk factor is thus not necessarily the cause of a disease but does increase the probability that a person exposed to the factor may get the disease.

•**Classification of Risk factors**

1. Modifiable

smoking, lack of physical activity…….

or

2. Non-modifiable.

age, sex, genetic back ground

Risk groups

A high risk group can be defined as a group of people or a subsection of the population, who, by virtue of certain characteristics, are likely to have a higher probability of suffering from one or more diseases or from general ill health.

Risk groups

Non-modifiable characteristic

- Age
- sex (males are more susceptible to IHD), or
- genetic background (family history of diabetes), or
- blood groups,

Thalassemia…

Risk groups

Modifiable characteristic

Obese

Smokers

Hypertension and diabetes mellitus.

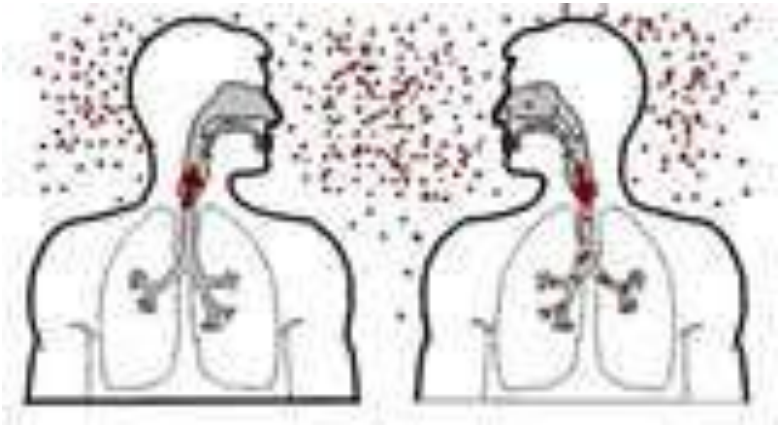
Risk groups

Socio-demographic and environmental characteristic

low income, low education groups, slum dwellers, people living in rural and remote hilly areas or occupation

Exposure

It is accumulation of factors **sufficient to begin the disease process** in a susceptible host.

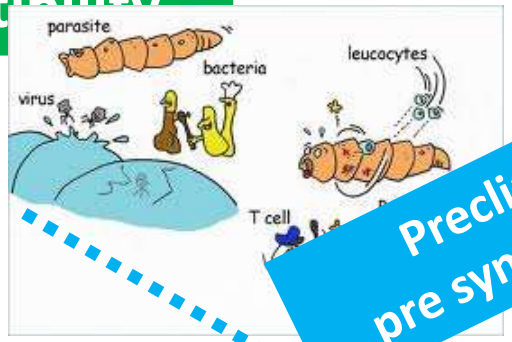


For infectious disease, the exposure usually is a microorganism.

Natural History Of Disease

Healthy person

Susceptibility



Entry Of Agent

Biologic Onset

Preclinical/ pre symptomatic

Signs & symptom

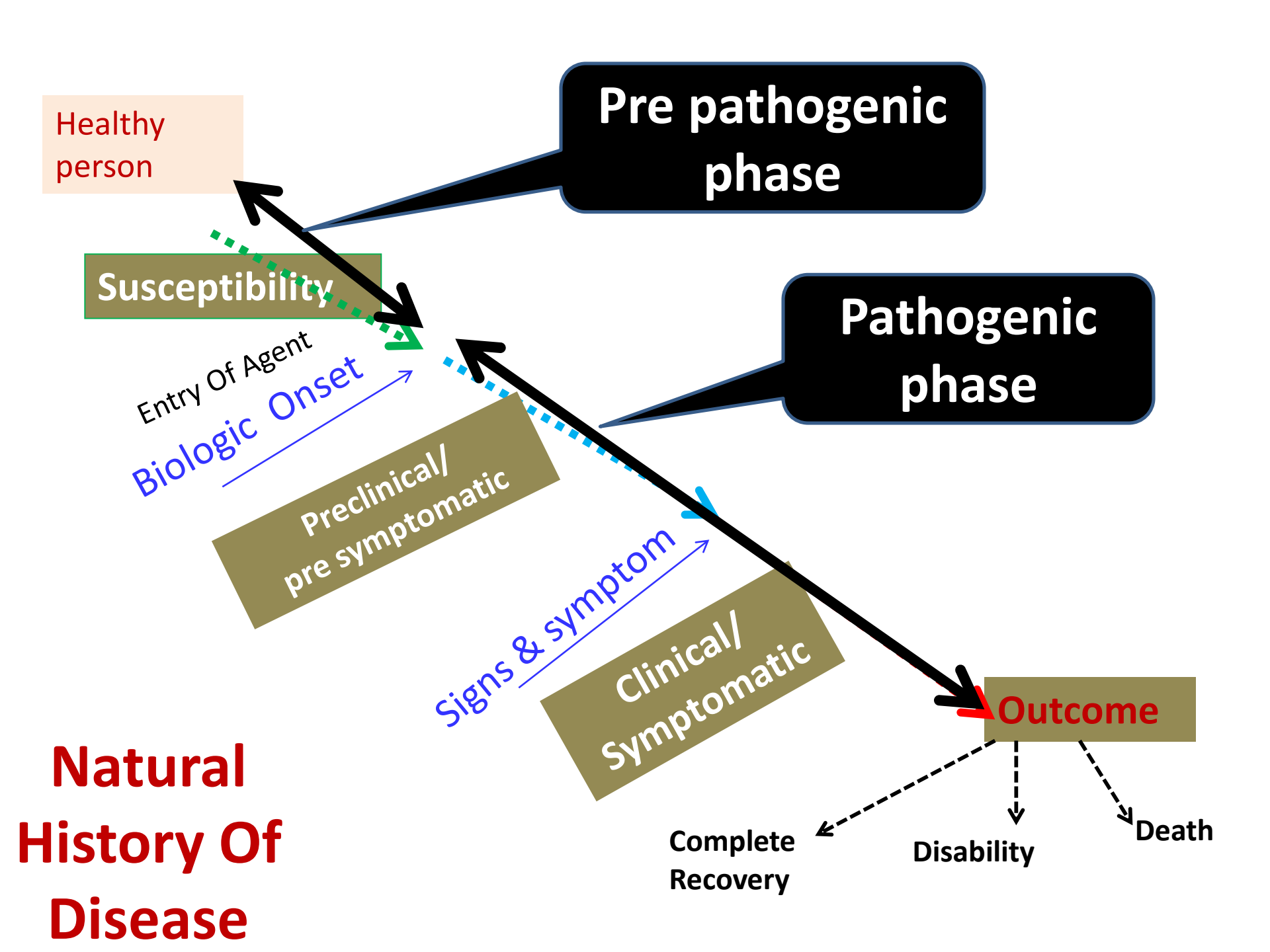
Clinical/ Symptomatic

Outcome

Complete Recovery

Disability

Death


Healthy person
Pre pathogenic phase
Susceptibility
Pathogenic phase
Entry Of Agent
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Preclinical/ pre symptomatic
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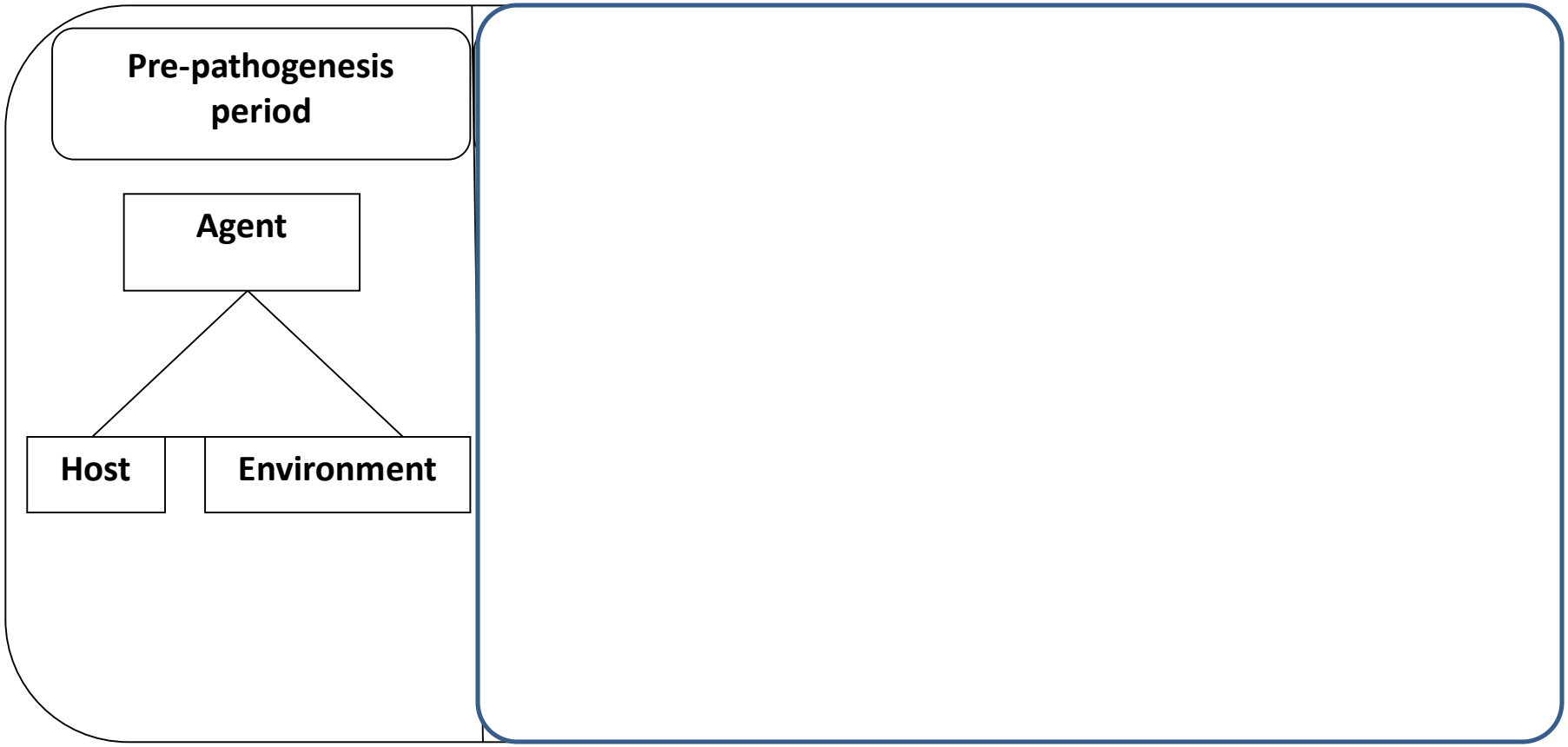
Death
Natural History Of Disease


Pre-pathogenesis period
Agent
Host
Environment

Pathogenesis phase: Stages

- Stage of subclinical disease /pre symptomatic
- Stage of clinical disease/ symptomatic
- Stage of disease outcome- Complete recovery, Disability, Death

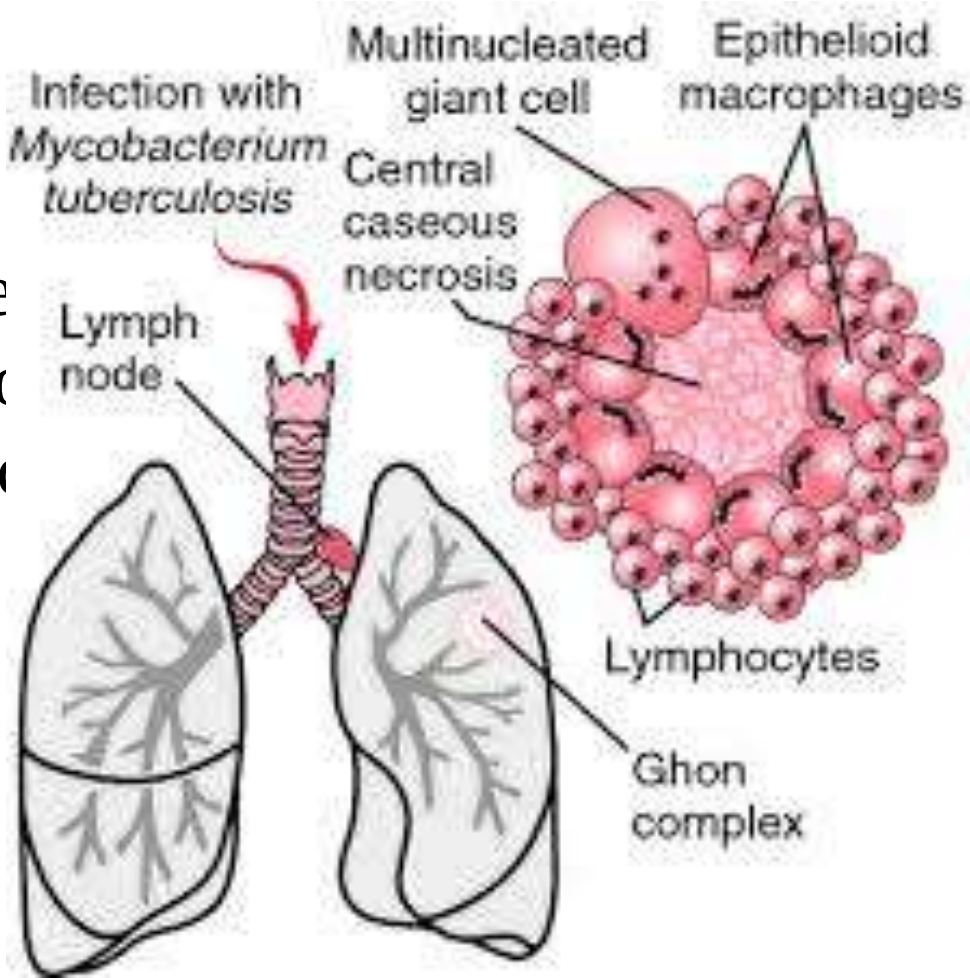
Stage of subclinical disease /pre symptomatic

•A period of subclinical or inapparent pathologic changes follows exposure, ending with the onset of symptoms.

For example:

A)Atherosclerotic change coronary vessels prior t signs or symptoms of Myo infarction

B) Ghon's focus in TB



Stage of clinical disease:

Spectrum

- The onset of symptoms marks the transition from subclinical to clinical disease.
- It may be
  1. Clinically apparent or

  2. Mild to severe or fatal

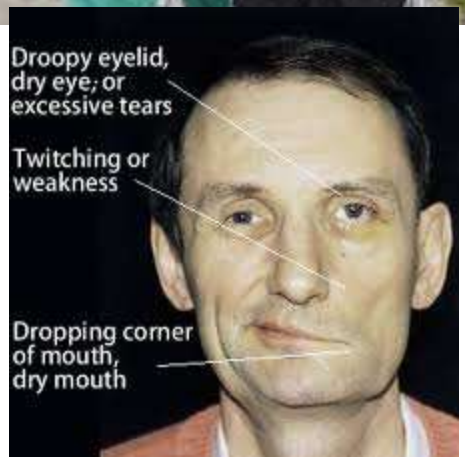
Stage of Disability

Disability: Any temporary or long term reduction of a person's activity as a result of acute or chronic condition.

For example:

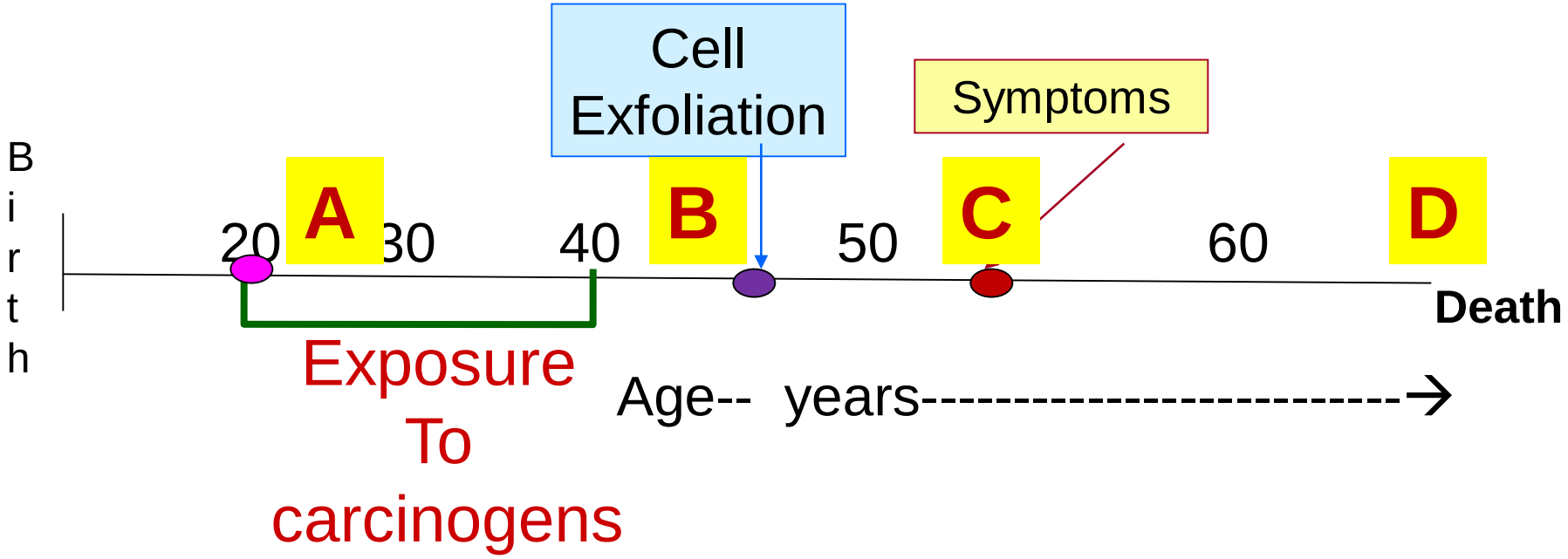
1-restricted movement after healing of fracture ,

2-Paralysis after the Cerebral Stroke (Brain Heamorrhage)



Exercise

Identify the Stage/Phase



IDENTIFY the Phases in Natural history of Cancer

A to B

B to C

B to D

C to D

Factors affecting the clinical Phase/ Spectrum Of disease

Infectivity Refers to the proportion of exposed persons who become infected.

Pathogenicity Refers to the proportion of infected persons who develop clinical disease.

Virulence Refers to the proportion of persons with clinical disease who become severely ill or die.

Exercise

Ex.1

- S. antibody against Hepatitis A was found in 50% of exposed children.
- Out of these 10% developed Clinical illness and 1% who developed clinical illness became seriously ill

Ex.2

- In a year 500 people were bitten by rabid dog.
- 450 (90%) were positive for S. antibodies.
- All positive developed clinical illness
- 400 (90%) positive people expired

Both are Hypothetical situation

Stage of clinical disease:

The clinical spectrum also depends on

Infectivity Refers to the proportion of exposed persons who become infected.

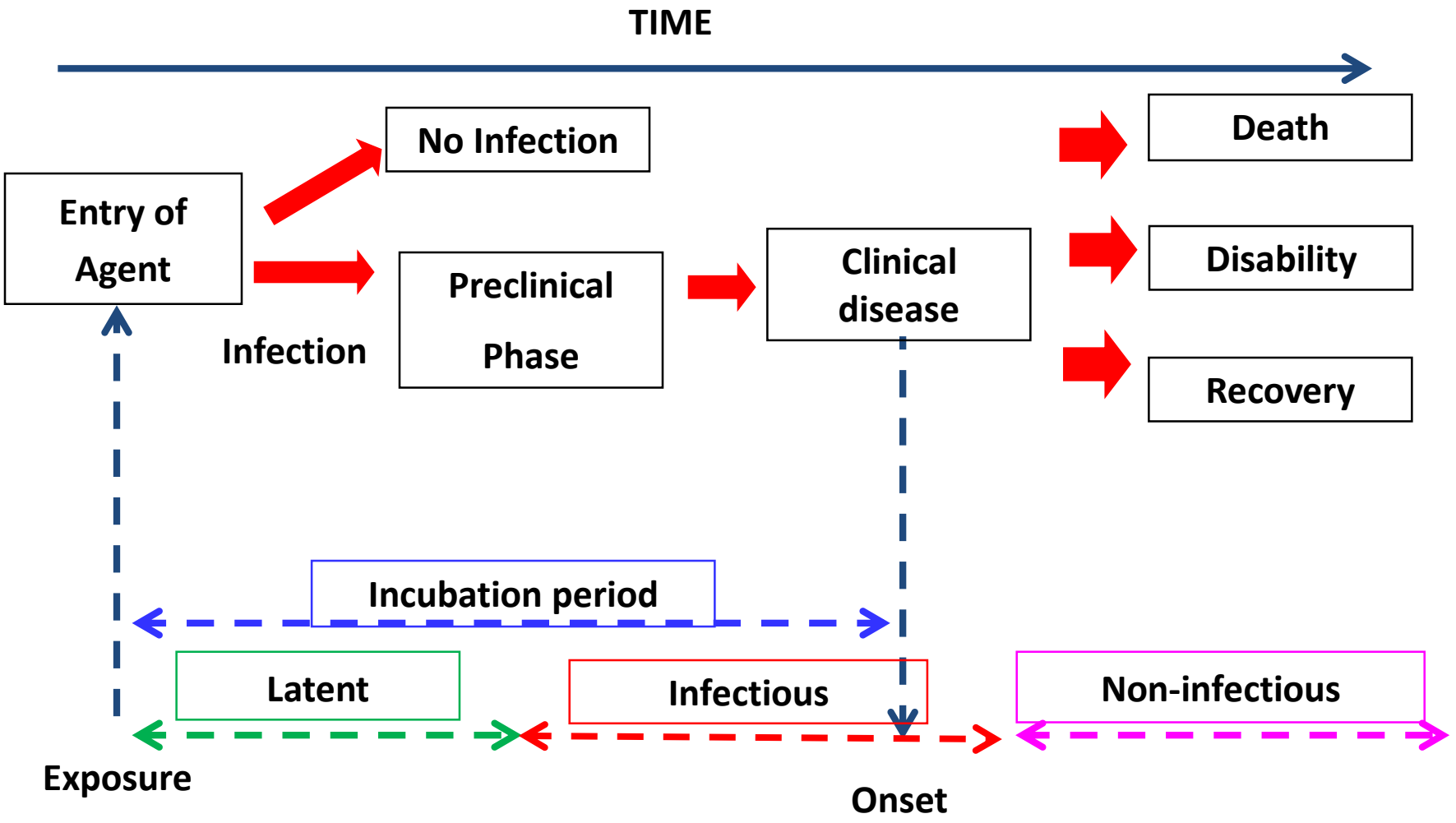
Hep. A =50% Rabies= 90%

Pathogenicity Refers to the proportion of infected persons who develop clinical disease.

Hep. A =10% Rabies= 100%

Virulence Refers to the proportion of persons with clinical disease who become severely ill or die.

Hep. A =1% Rabies= 90%


TIME
No Infection
Death
Entry of Agent
Preclinical Phase
Clinical disease
Disability
Infection
Recovery
Incubation period
Latent
Infectious
Non-infectious
Exposure
Onset

- Latent period

  the time interval from infection to development of infectiousness

- Infectious period

  the time during which time the host can infect another susceptible host

- Non-infectious period

  the period when the host's ability to transmit disease to other hosts ceases

- Incubation period

  the time interval between infection to development of clinical disease

Incubation period- Infectious disease

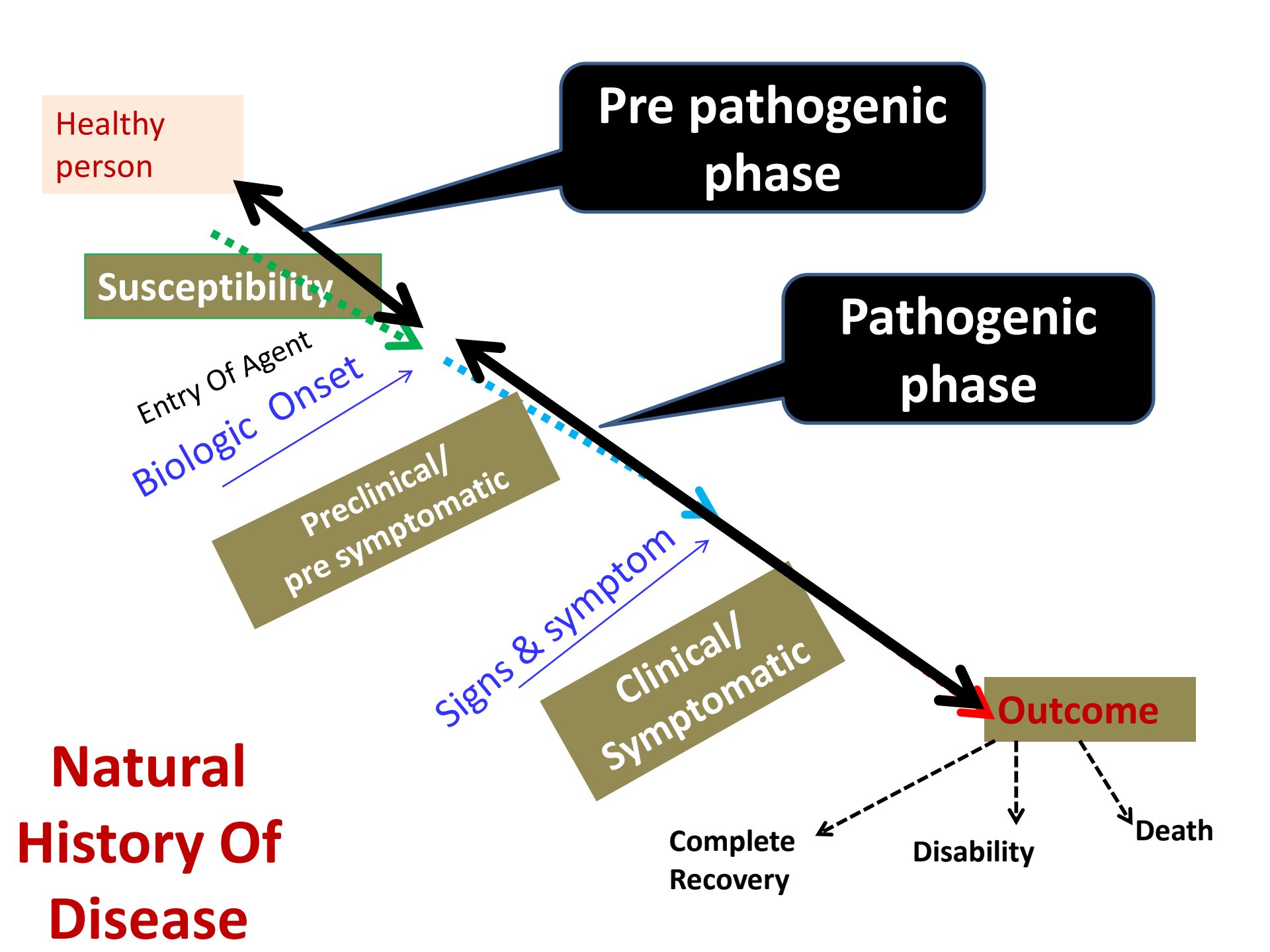
Even for a single disease, the characteristic incubation period has a range.
For example,
for Hepatitis A: 2 to 6 weeks,
HIV/AIDS: 6 months to 8 years

Incubation period- Infectious disease

Similar

Latent period for Non infectious disease

Importance Of Natural History Of The Disease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Pre pathogenic phase
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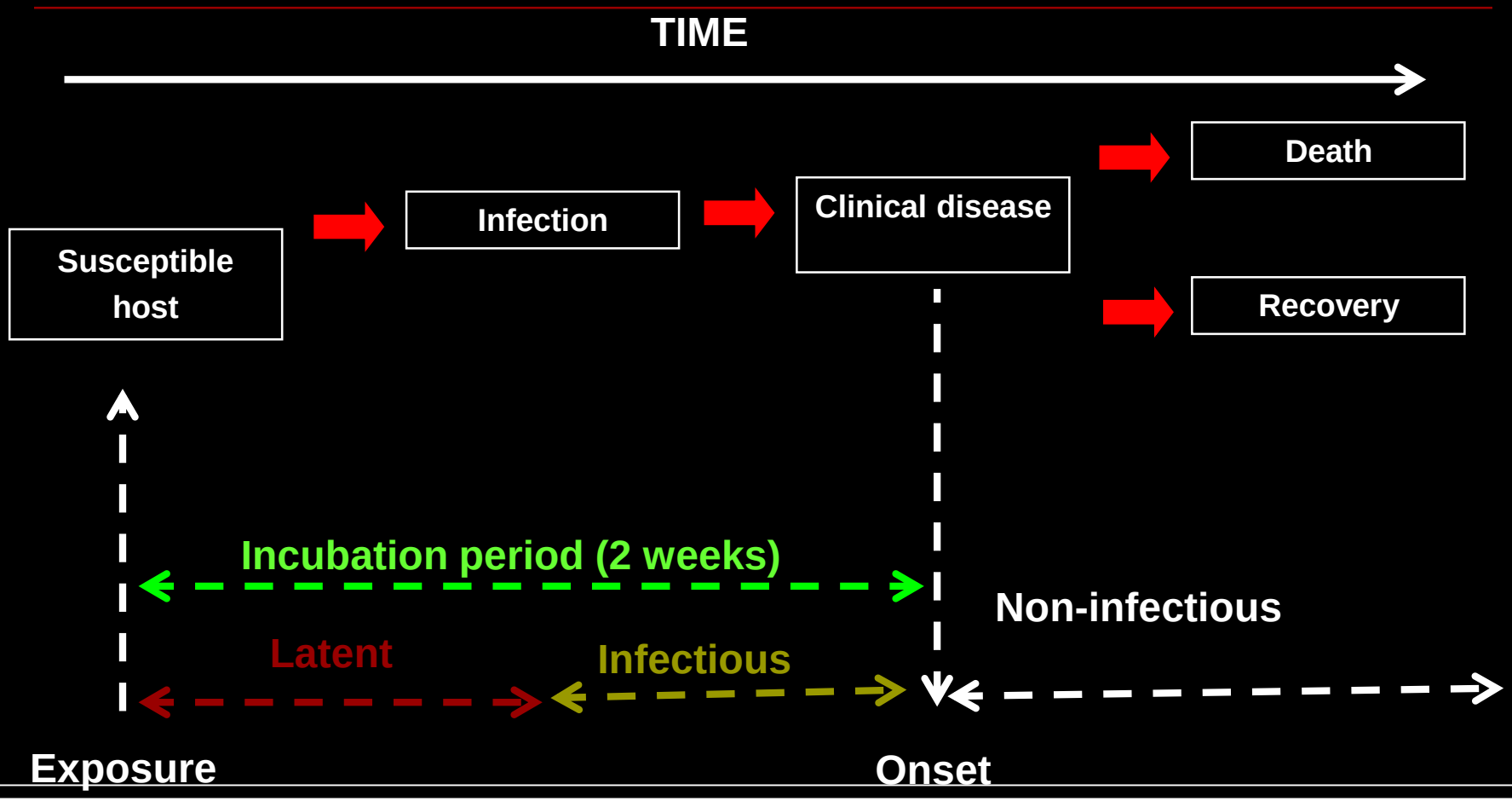
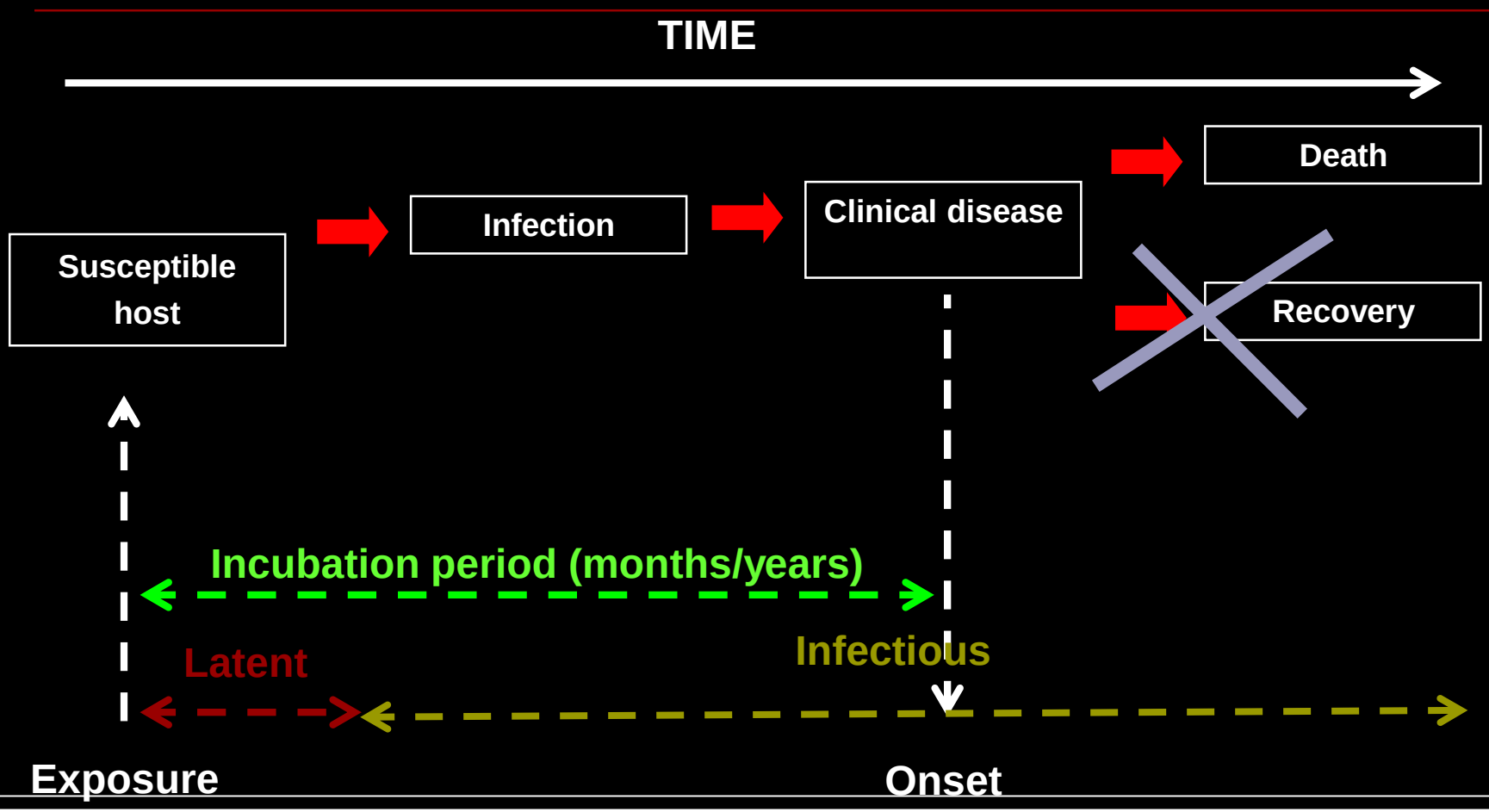
Natural History Of Disease

Chicken pox

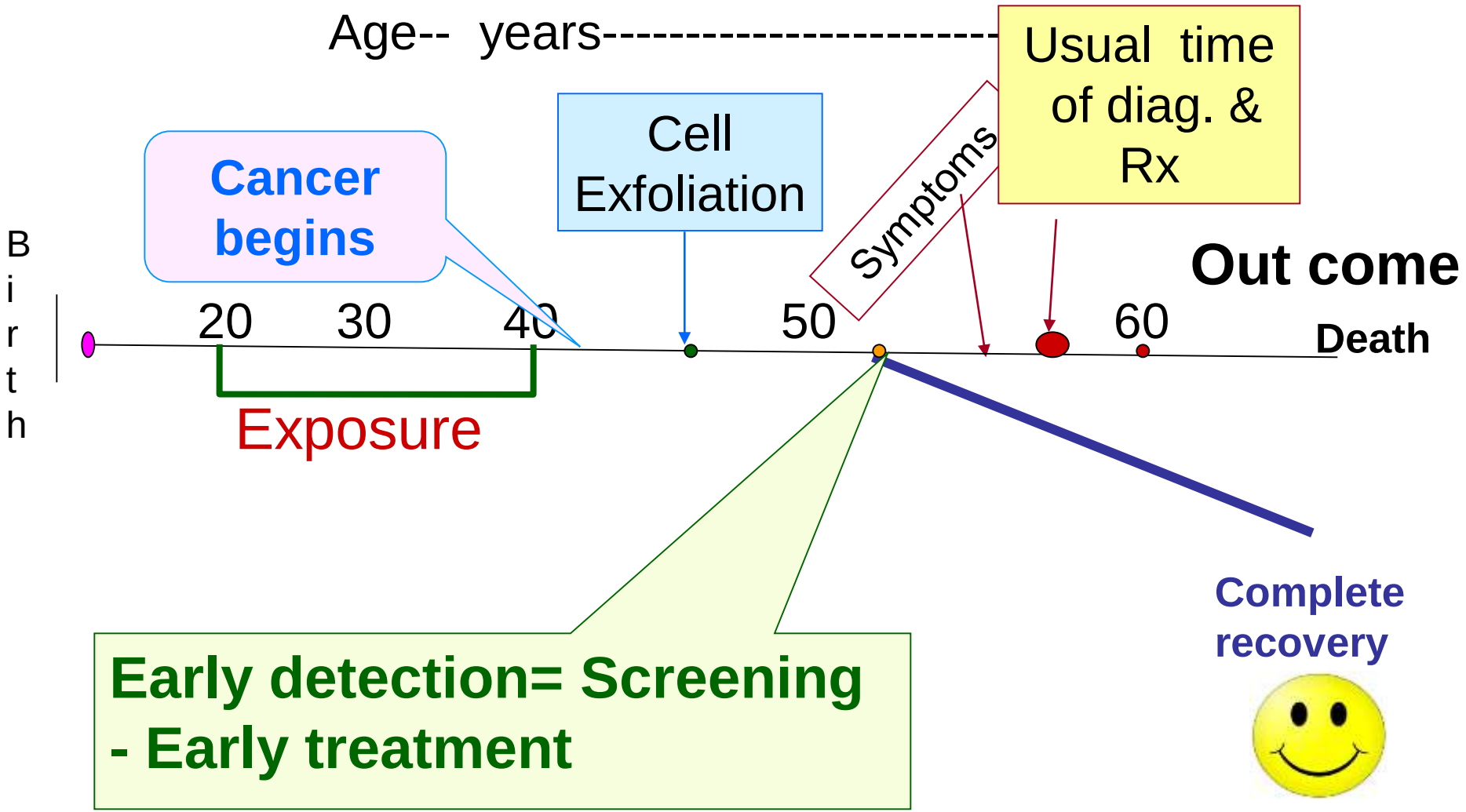

TIME
Death
Infection
Clinical disease
Susceptible host
Recovery
Incubation period (2 weeks)
Non-infectious
Latent
Infectious
Exposure
Onset

HIV


TIME
Susceptible host
Infection
Clinical disease
Death
Recovery
Incubation period (months/years)
Latent
Infectious
Exposure
Onset

Importance Of Natural History Of The Disease

1. Knowledge of the natural history of disease for causal understanding in importance for disease prevention and control.
2. Alteration in natural history of disease >>> changing the out come from death >>> survival/ complete recovery


Age-- years----------
Usual time of diag. & Rx
Cell Exfoliation
Symptoms
Cancer begins
Out come
Birth
20
30
40
50
60
Death
Exposure
Complete recovery
Early detection= Screening
- Early treatment

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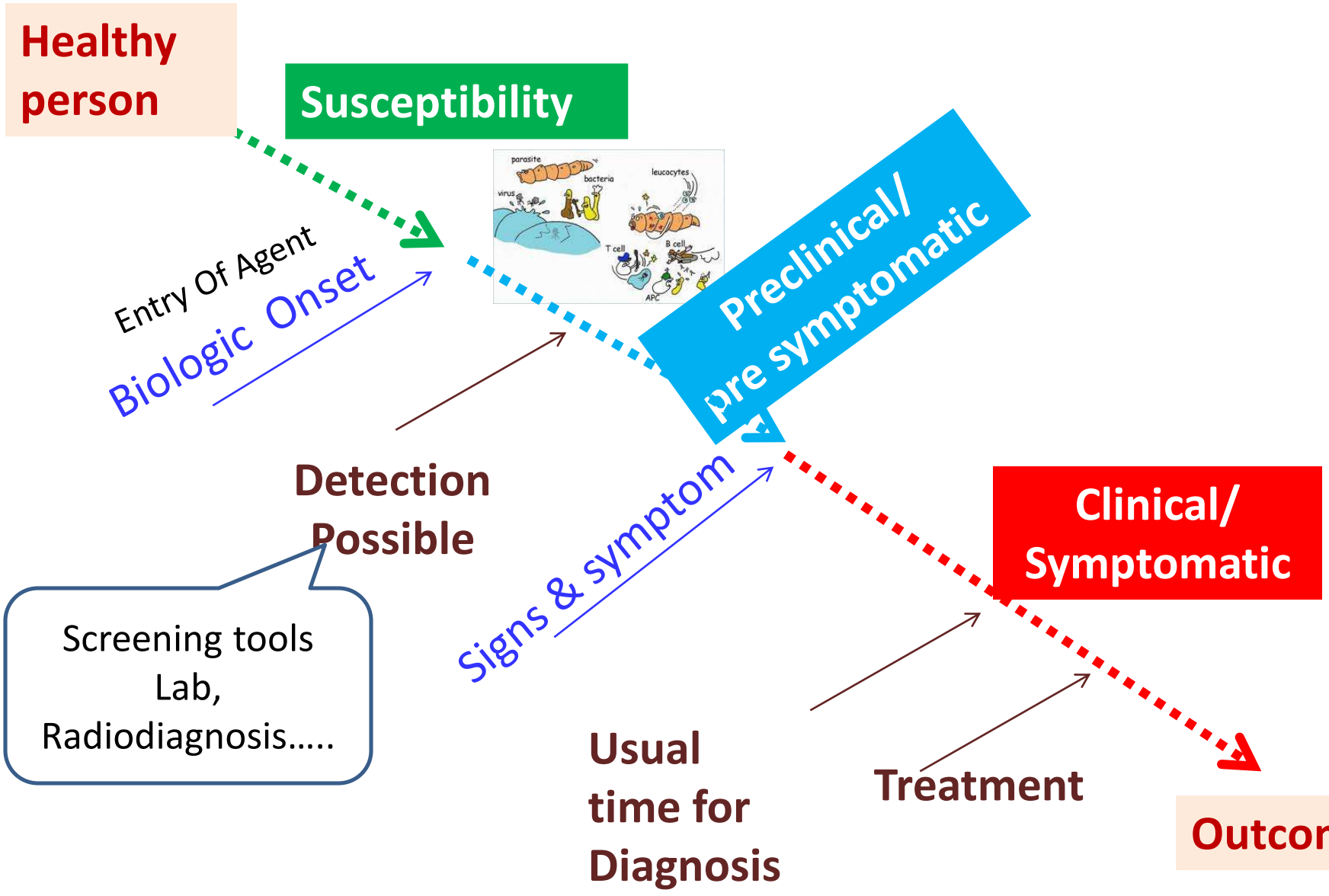
Importance Of Natural History Of Disease



Early Diagnosis -- advantages

- Treatment before permanent damage/complication
- Less --suffering, loss of days of job
- Less expensive
- Reduce the period of infectivity>>> less spread in community