

Natural History of Disease

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Introduction

“When does a disease actually begin—when symptoms appear or much before that?”

- A. Disease begins long before symptoms appear, during the **pre-pathogenesis phase**, which is part of the **natural history of disease**.

Introduction

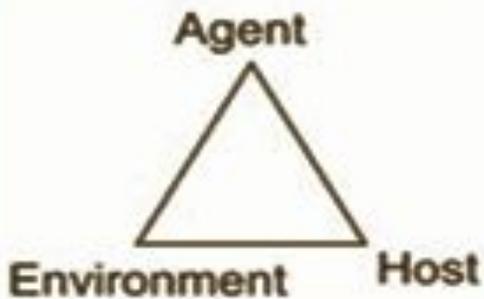
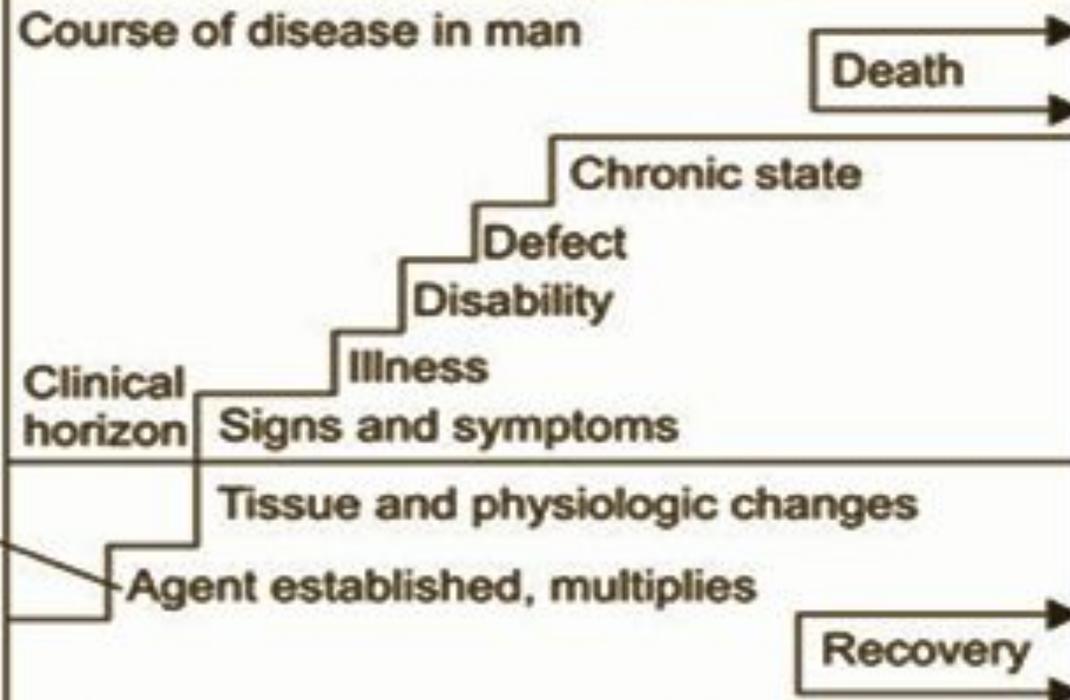
- **Disease results from a complex interaction** between many factors such as man, agent and the environment.
- The term natural history of disease refers to the **series of events from the earliest stage of its pre-pathogenesis phase to its termination as recovery , disability or death, in the absence of treatment or prevention.**
- Each disease has its own unique natural history and it may differ from individual to individual.
- **What the physician sees is just an episode** in the natural history of disease.

Introduction

There are two phases in Natural History of Disease

1. Pre- Pathogenesis phase
2. Pathogenesis phase

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Period of prepathogenesis		Period of pathogenesis		
Disease process	<p>Before man is involved</p> <p>Agent</p>  <p>Environment Host</p> <p>Bring agent and host together or produce disease provoking stimulus</p>	<p>Course of disease in man</p>  <p>Death</p> <p>Chronic state</p> <p>Defect</p> <p>Disability</p> <p>Illness</p> <p>Signs and symptoms</p> <p>Tissue and physiologic changes</p> <p>Agent established, multiplies</p> <p>Recovery</p>		
		<p>Inhuman host Interaction of host → host reaction → and stimulus</p> <p>Early pathogenesis → discernible → advanced → convalescence</p> <p>Early lesions disease</p>		
Level of prevention	Primary prevention	Secondary prevention	Tertiary prevention	
Modes of intervention	Health promotion Specific protection	Early diagnosis and treatment	Disability limitation	Rehabilitation

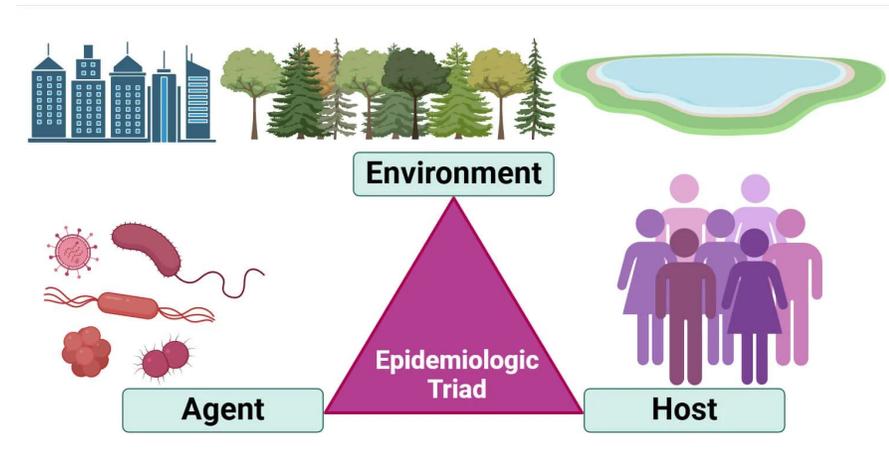
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Pre-Pathogenesis phase

- Period **preliminary to the onset of disease** in man
- Causative agent of disease not yet entered into man, but the factors which favour interaction with man are already existing in the environment.
- **Man in the midst of disease** or man exposed to the risk of disease
- In reality every person is in the pre-pathogenesis phase of many communicable and Non-communicable diseases.

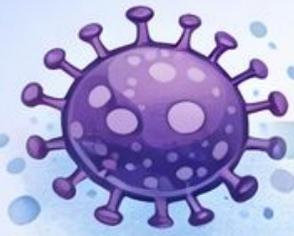
Pre-Pathogenesis phase

- Causative factors of disease may be classified as
 - Agent, Host and Environment factors.
- Mere presence of these factors will not cause disease
- Interaction of these factors will initiate disease process in man
- Combination and Interaction between these three factors not only cause a single case to epidemics but also the distribution of disease in community.



Pathogenesis phase

- Pathogenesis phase begins with entry of causative agent in the host.
- Disease agent multiplies □ Induce tissue and physiological changes □ Disease progress through incubation period □ Early and late pathogenesis □ Final outcome may be recovery or disability or death.
- The pathogenesis phase may be modified by intervention measures such as immunization and chemotherapy.



Intervention Measures
Modifying the Course of Disease



Interruption & Prevention



Pathogenesis phase in Communicable diseases

- Host reaction to infection with a disease agent is not predictable.
- **The infection may be**
 - clinical or subclinical,
 - typical or atypical or
 - **the host may become a carrier with or without clinical disease**

Pathogenesis phase in Non-Communicable diseases

- **In chronic diseases early pathogenesis phase is less dramatic.**
- This phase is called as presymptomatic phase. The pathological changes in this stage or below the level of clinical horizon
- **By the time signs and symptoms appear, the disease is already well advanced into late pathogenesis**
- In many chronic diseases agent, host and environmental interactions not yet understood.

Agent Factors

- **Agent is defined as a substance, living or non living or a force, tangible or intangible , the excessive presence of or relative lack of which may initiate or perpetuate a disease process**
- A disease may have a single agent, a number of independent alternative agents or a complex of two or more factors whose combined presence is essential for the development of disease.
- Disease agents may be classified as **biological agents, nutrient agents, physical agents, chemical agents, mechanical agents and social agents**

Biological agents

Examples: Viruses, Bacteria, Parasites etc.

These agents exhibit certain host related biological properties such as infectivity, pathogenicity and virulence.

Infectivity: ability of agent to invade and multiply in a host

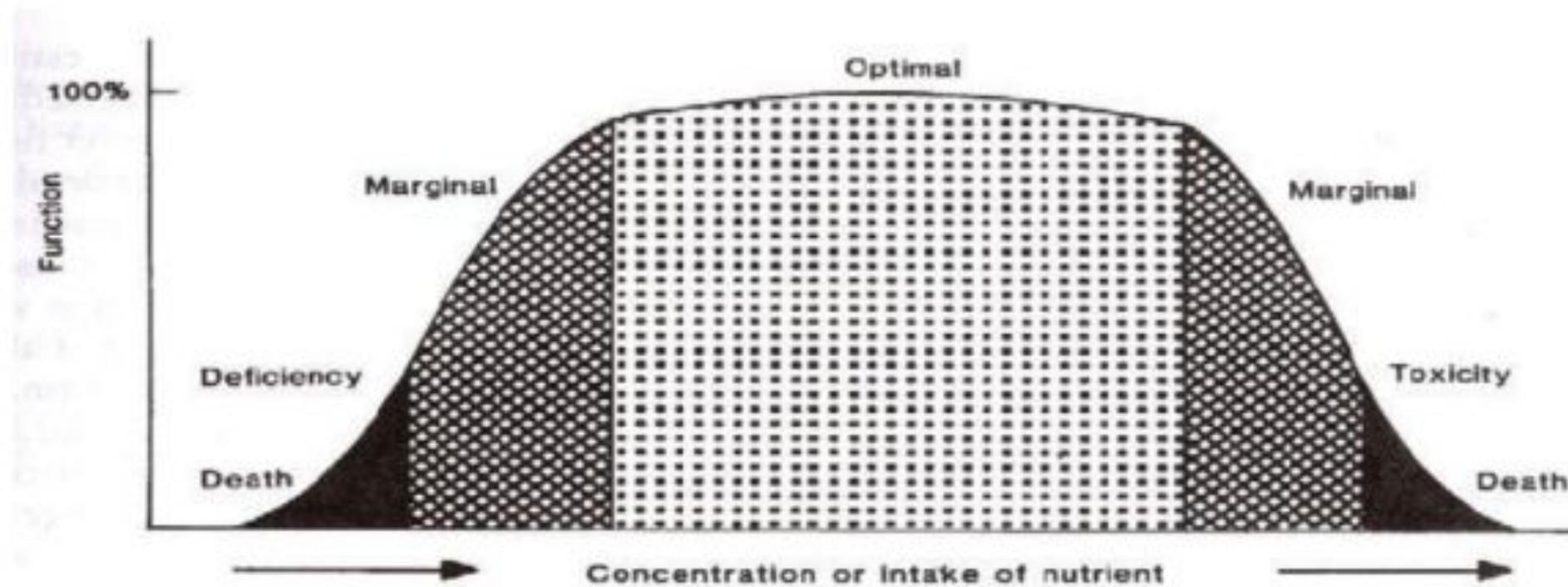
Pathogenicity: Ability to induce clinically apparent illness

Virulence: Proportion of clinical cases resulting in severe clinical manifestations.

Case fatality rate is one way of measuring virulence.

Nutrient agents

Any excess or deficient intake of nutritive elements cause disease



Physical, Chemical and Mechanical agents

Physical agents: Heat, cold, humidity, temperature, pressure, electricity or sound

Chemical agents:

- Endogenous chemicals: Chemicals produced in the body like Blood urea, Serum Bilurubin Ketones, Uric acid, Calcium carbonates
- Exogeneous chemicals: Allergens, metals, fumes, dust, gases, insecticides – Contact, inhalation, ingestion, inoculation

Mechanical agents: Exposure to chronic friction and other mechanical forces may result in crushing, tearing, sprains, dislocations and even death.

Absence or insufficiency or excess of a factor necessary to health

1. Chemical factors – Hormones, Enzymes
2. Lack of structure - Thymus
3. Lack of part of structure – Cardiac defects
4. Chromosomal factors – Mongolism, Turners syndrome
5. Immunological factors - agammaglobulinemia

Social agents



Poverty



Smoking



**Abuse of
Drugs & Alcohol**



**Unhealthy
Lifestyles**



Social Isolation



Social Isolation



**Maternal
Deprivation**

Host factors

Host factors are intrinsic characteristics such as age, sex, genetic makeup, immunity, nutrition, physiological state, lifestyle, occupation, and socio-economic status that determine an individual's susceptibility, response, and outcome of disease.

Host Factors

Influencing Susceptibility & Outcome of Disease



Environmental factors

Environment can be categorized into two groups.

1. Macro Environment
2. Micro Environment

Environmental factors

Category of Environment	Components	Examples / Disease Association
Physical Environment	Climate (temperature, rainfall, humidity), seasons, altitude, housing, ventilation	Malaria – rainfall & temperature; Heat stroke – high ambient temperature
Biological Environment	Vectors, reservoir hosts, intermediate hosts	Malaria – <i>Anopheles</i> mosquito; Plague – rats & fleas
Social Environment	Overcrowding, population density, customs, traditions, literacy, social practices	Tuberculosis – overcrowding; HIV – high-risk social behavior
Economic Environment	Poverty, income level, employment	Poverty → malnutrition, ↑ communicable diseases

Environmental factors

Category of Environment	Components	Examples / Disease Association
Psychosocial Environment	Stress, family support, social relationships	Stress → hypertension, mental illness
Sanitation & Environmental Hygiene	Safe water supply, sewage disposal, solid waste management, food hygiene	Cholera – unsafe water; Typhoid – poor sanitation
Health Services Environment	Availability, accessibility, affordability of health services	Poor access → delayed diagnosis & treatment

Summary

1. Disease is a result of **interaction between Agent, Host, and Environment**. **Natural history of disease** is the **course of disease from pre-pathogenesis to outcome, in the absence of intervention**
2. **Two main phases:**
 - Pre-pathogenesis phase:** Disease not yet established, Risk factors present
 - Pathogenesis phase:** Entry and multiplication of agent, Tissue and physiological changes, Incubation / latent period, Early and late pathogenesis, Outcomes: **recovery, disability, or death**. **Interventions (immunization, chemotherapy, early diagnosis) can modify the course**
3. What clinicians see is **only a small part** of the entire natural history

Thank you....

