

Natural History of Disease and Concepts of Prevention and Control

Dr. Shatha Alduraywish,

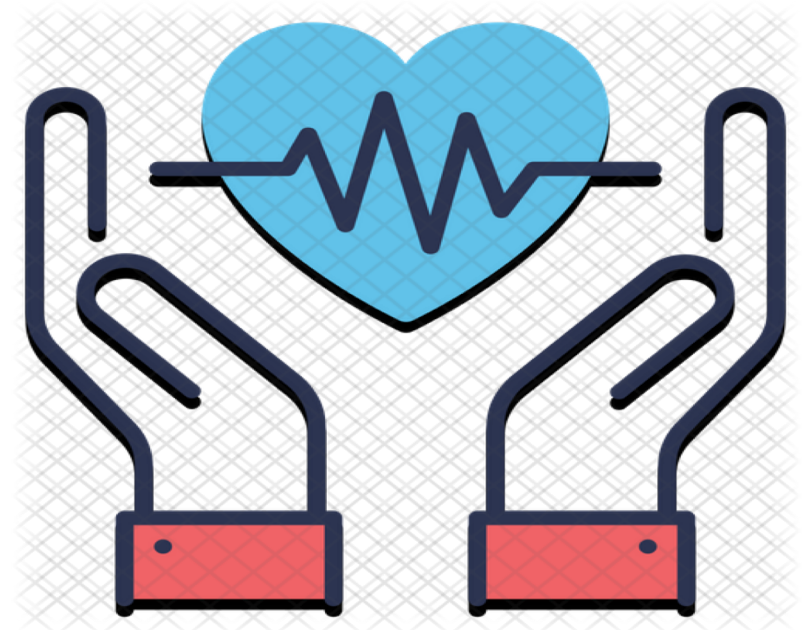
MBBS; MEpi; PhD; TTS

Assistant Professor, Consultant Preventive
Medicine and Public Health

Department of Family and Community Medicine

Email: salduraywish@ksu.edu.sa

September 2020



Session Objectives

1. To describe **theories** postulated for the development of diseases
2. Explain the concept of **iceberg phenomenon** of diseases
3. Understand the **relationship** between host, environment and agent in disease causation
4. Define the term **prevention**
5. Identify the **level of prevention** in relation to stage of disease development
6. Identify the **measures** applied at each level of prevention regarding controlling the reservoir, interruption of transmission, and the susceptible host

Session Overview

- Theories of Disease Causation.
- Natural History of Disease
- Iceberg of Disease
- Concept of Prevention
- Modes of Intervention



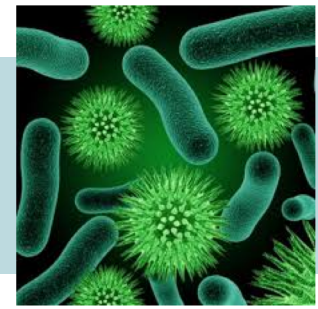
Health

“Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”

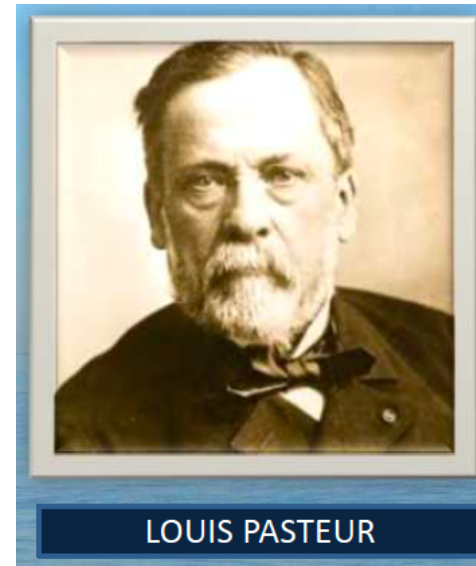
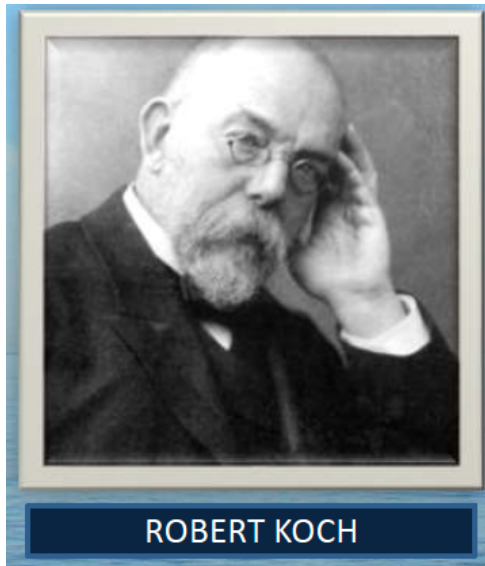
Theories Of Disease Causation



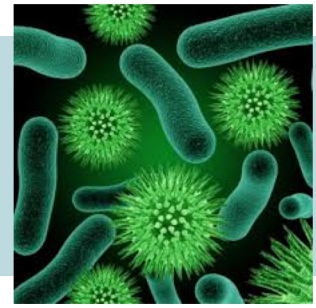
Germ Theory



- In the second half of 19th century
- Proposed by Robert Koch and Louis Pasteur (discovery of bacteria).

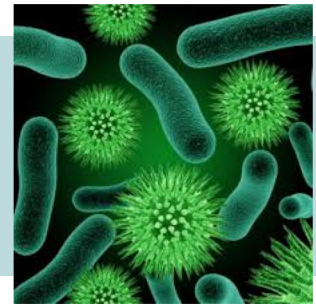


Germ Theory



Every human disease is caused by a microbe or germ, which is specific for that disease and one must be able to isolate the microbe from the diseased human being.

Germ Theory



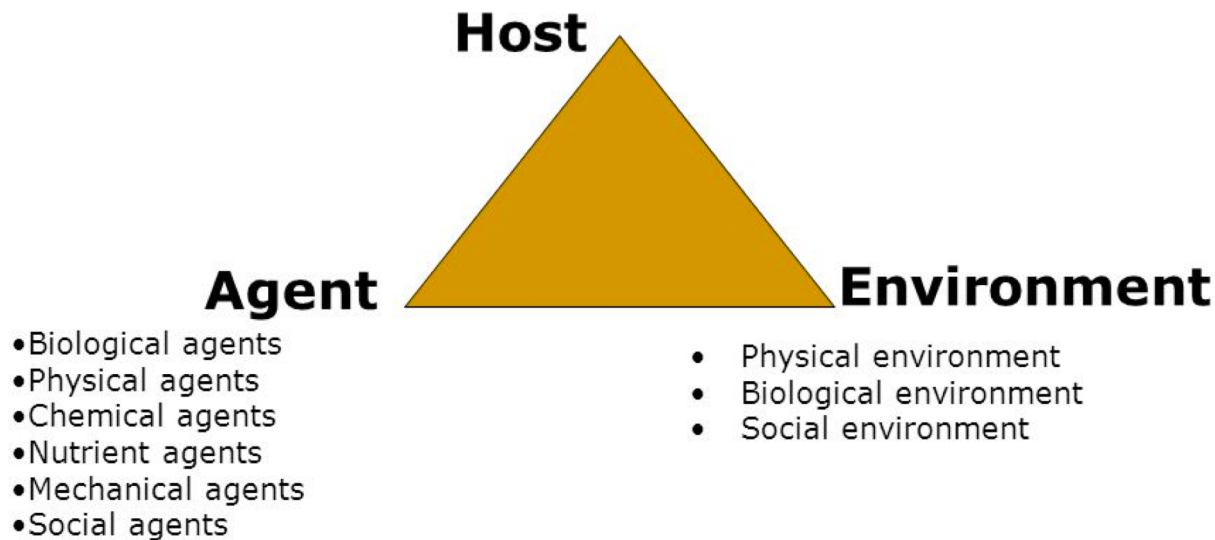
One to one relationship between causal agent and disease.



The Epidemiological Triad

Epidemiologic triad

- Demographic characteristics
- Biological characteristics
- Socioeconomic characteristics

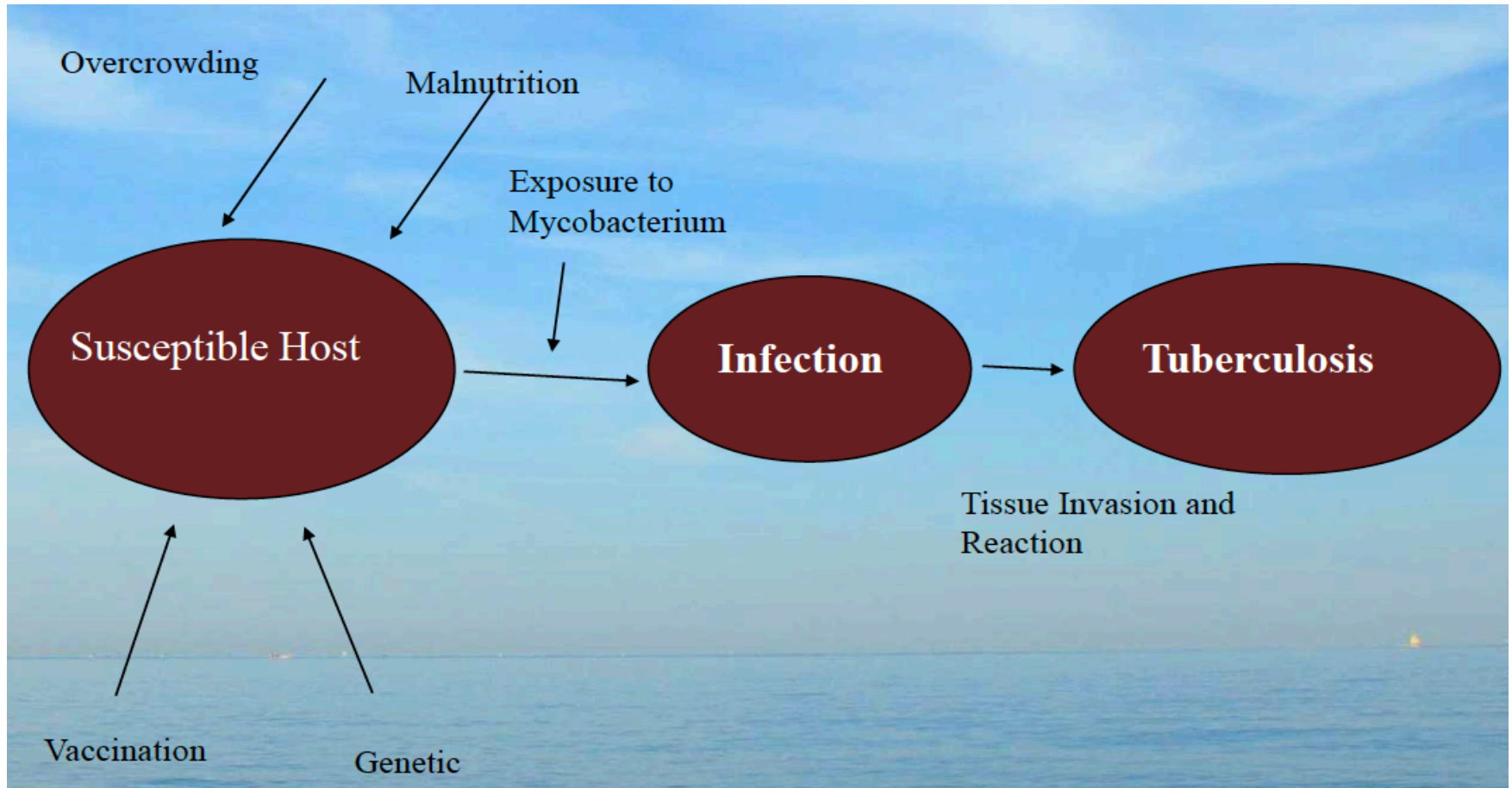


The Epidemiological Triad

Example

Not everyone exposed to tubercle bacteria develops tuberculosis but the same exposure in an undernourished or immunocompromised person may result in clinical disease and exposure occurs more in **overcrowding**.

The Epidemiological Triad



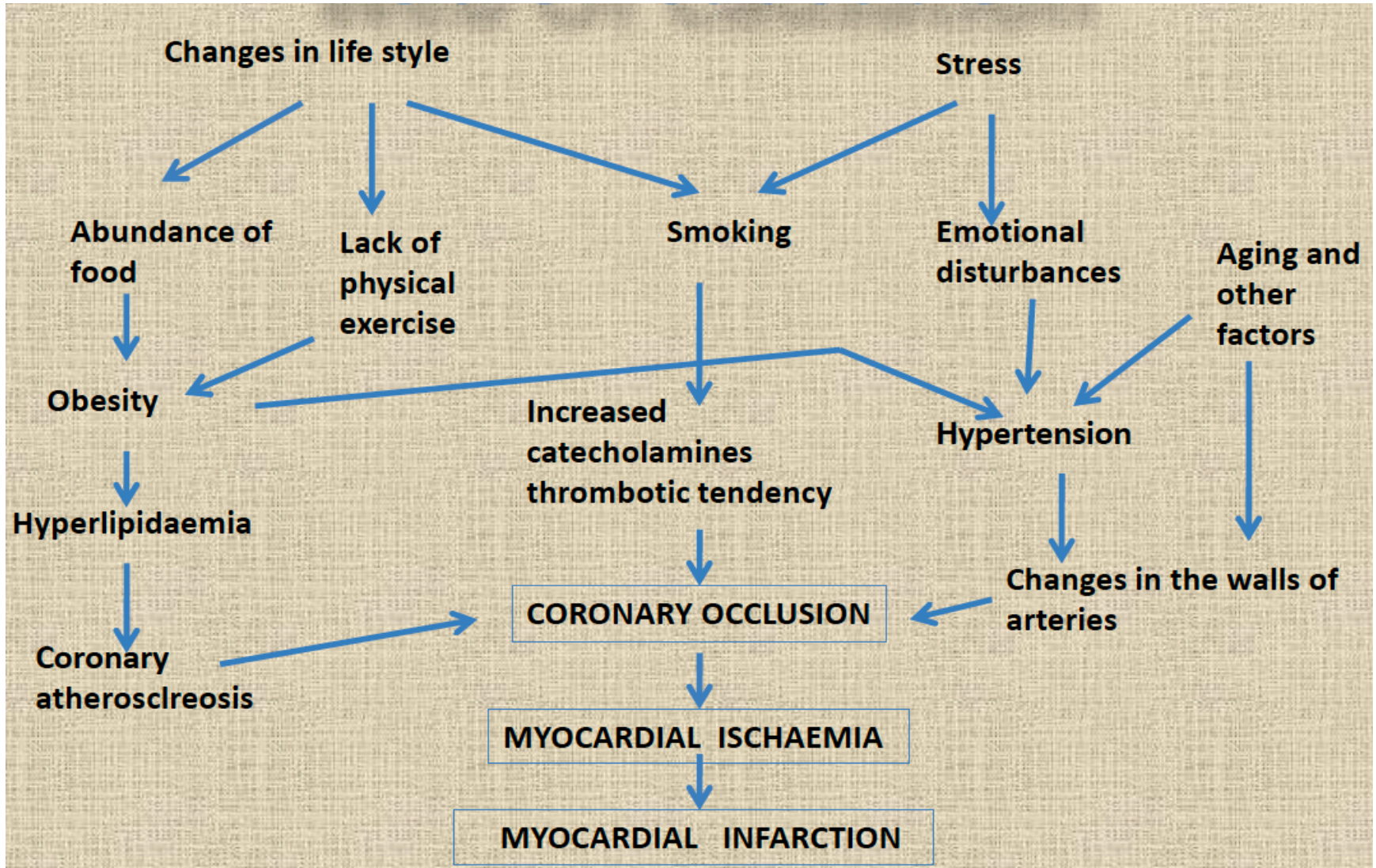
The Theory of “Web of Causation”

- Suggested by MacMohan and Pugh.
- The various factors are like an interacting web of a spider.
- **Each factor** has its own relative importance in **causing** the final departure from the state of health, as well as **interacts** with others, **modifying** the effect of each other.

The Theory of “Web of Causation”

- Ideally suited in the study of **chronic disease**, where the **agent is often not known** and disease is the outcome of **interaction of multiple factors**.
- This model of disease causation considers **all predisposing factors** of any type and **their complex interrelationship** with each other.

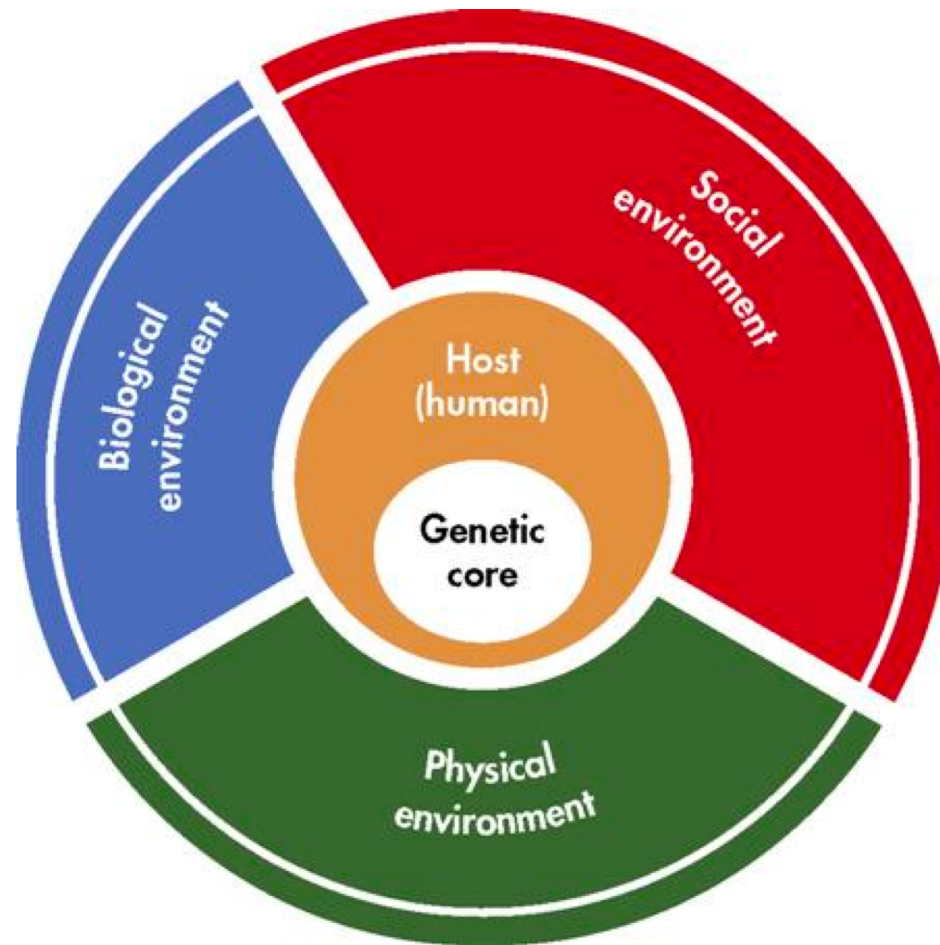
The Theory of “Web of Causation”



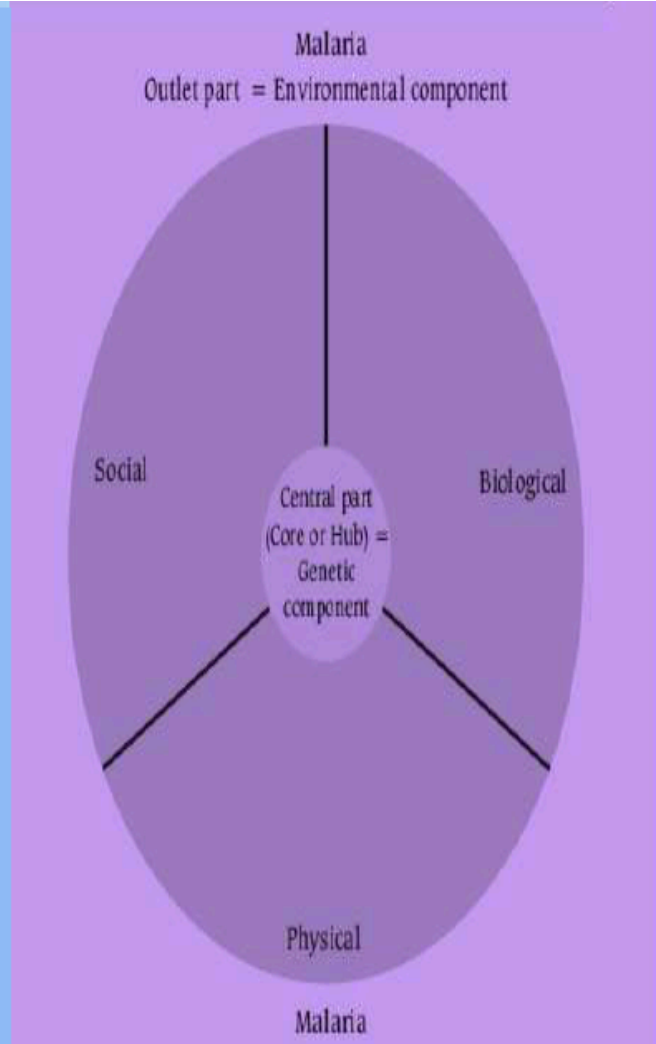
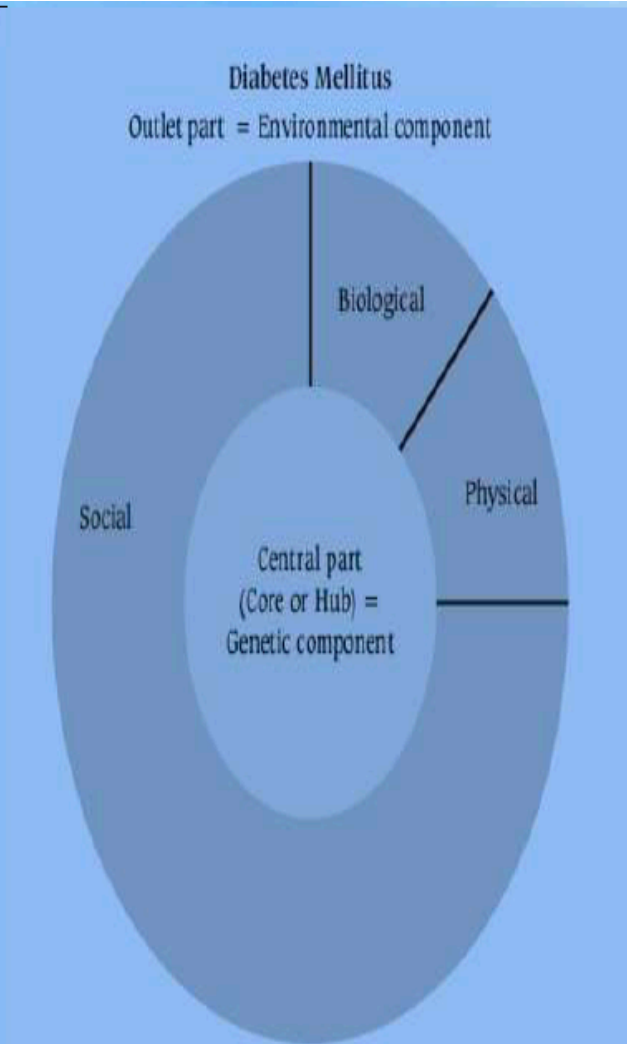
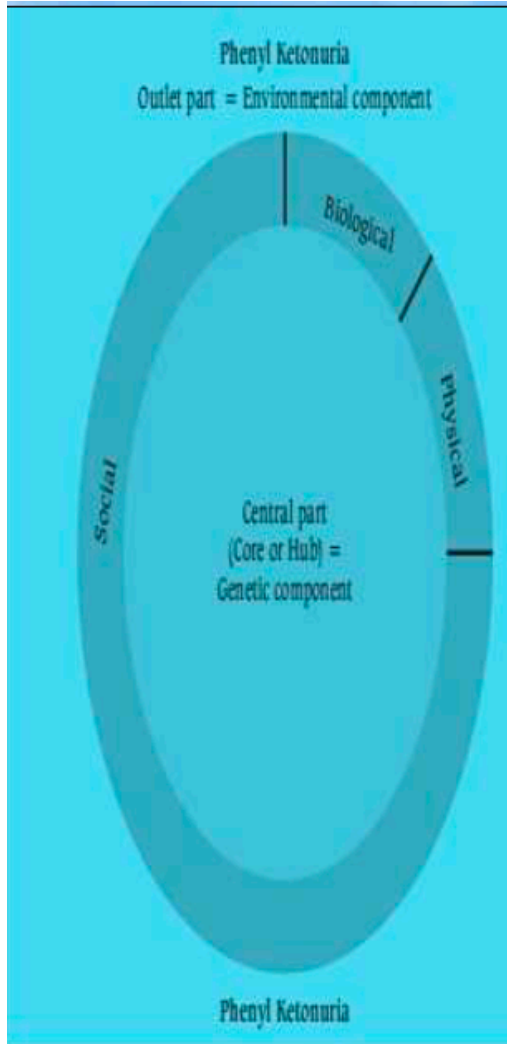
Wheel theory

- As medical knowledge advanced, an additional aspect of interest that came into play is the comparative role of “genetic” and the “environmental” (i.e. extrinsic factors outside the host) factors in causation of disease.
- The “triad” as well as the “web” theory does not adequately cover up this differential.
- To explain such relative contribution of genetic and environmental factors, the “wheel” theory has been postulated.

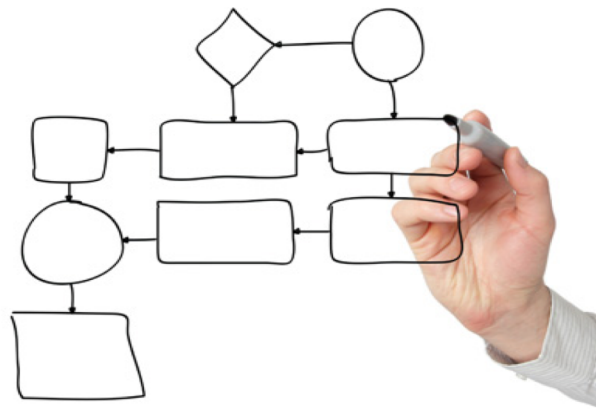
Wheel theory



Wheel theory



Natural History of Disease

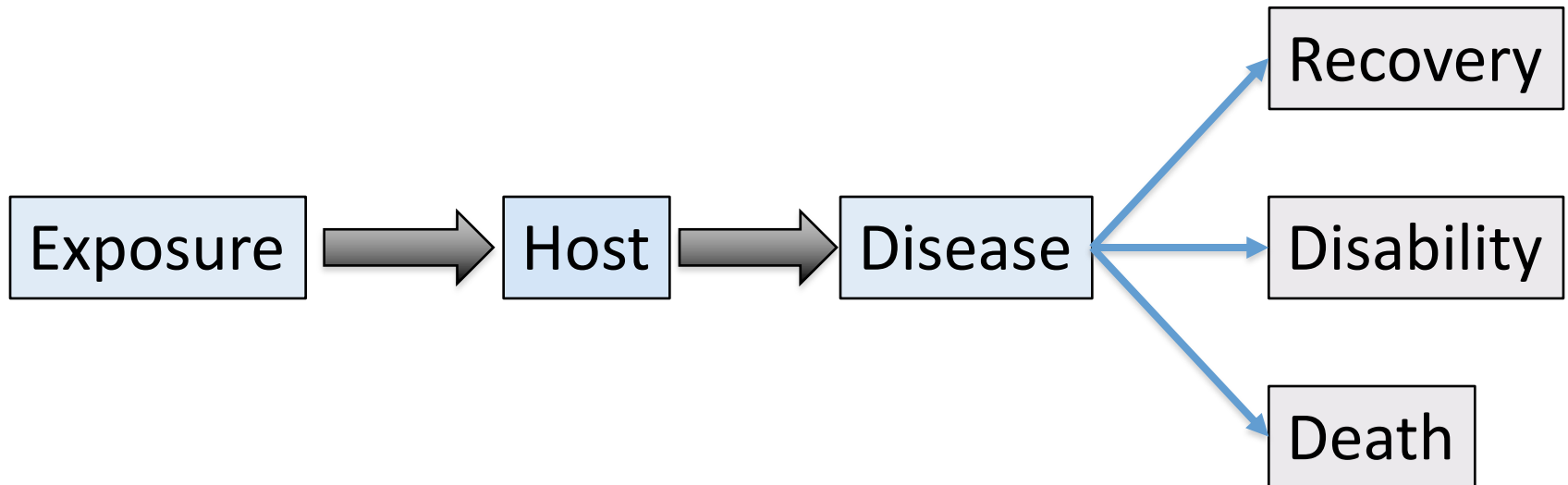


Definition

- Natural history of disease refers to the **progress** of a **disease process** in an individual **over time**, in the **absence** of intervention.
- The process begins with ***exposure to*** or accumulation of **factors** capable of causing disease

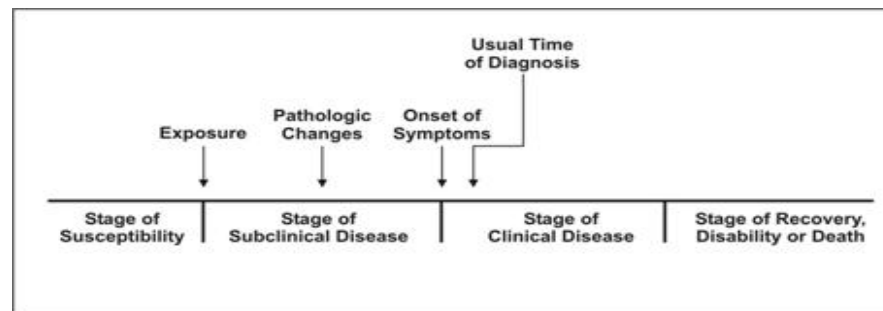
Without medical intervention, the process ends with:

- Recovery
- Disability
- Death



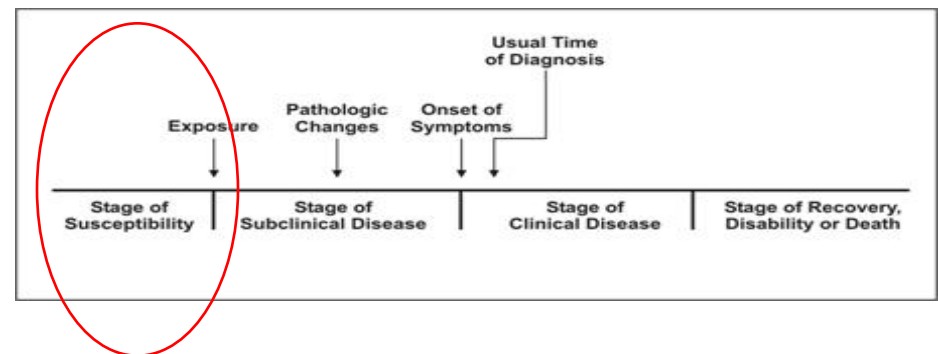
The natural history of disease can be seen as having three stages:

- The pre-disease stage,
- The latent (asymptomatic) disease stage, and
- The symptomatic disease stage.



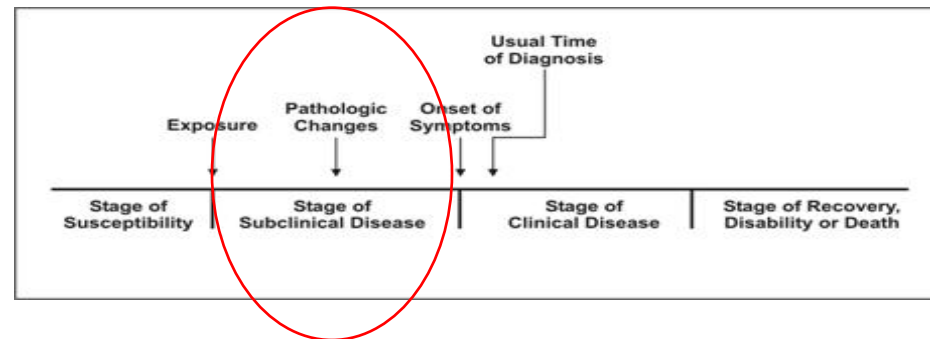
The pre-disease stage

- **Before** a disease process begins in an individual
- The individual can be seen as **possessing various factors** that promote or resist disease.
 - Genetic makeup
 - Demographic characteristics (age)
 - Environmental exposures
 - Immunologic capability
 - Nutritional history
 - Social environment
 - Behavioral patterns



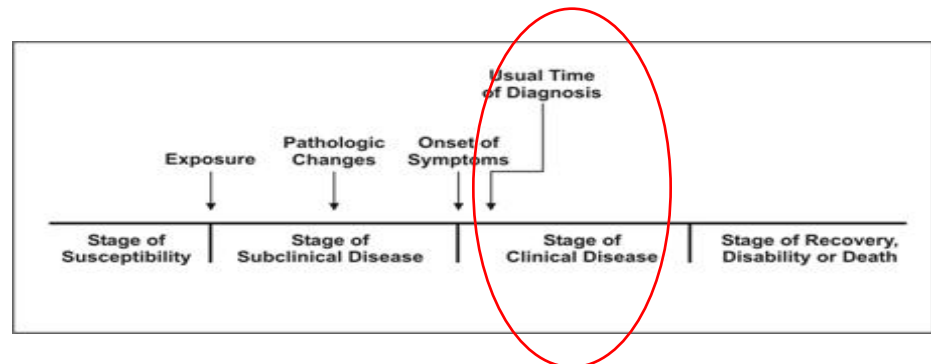
The latent (asymptomatic) disease stage

- If the disease-producing process is underway, but no symptoms of disease have become apparent
- Screening may be feasible

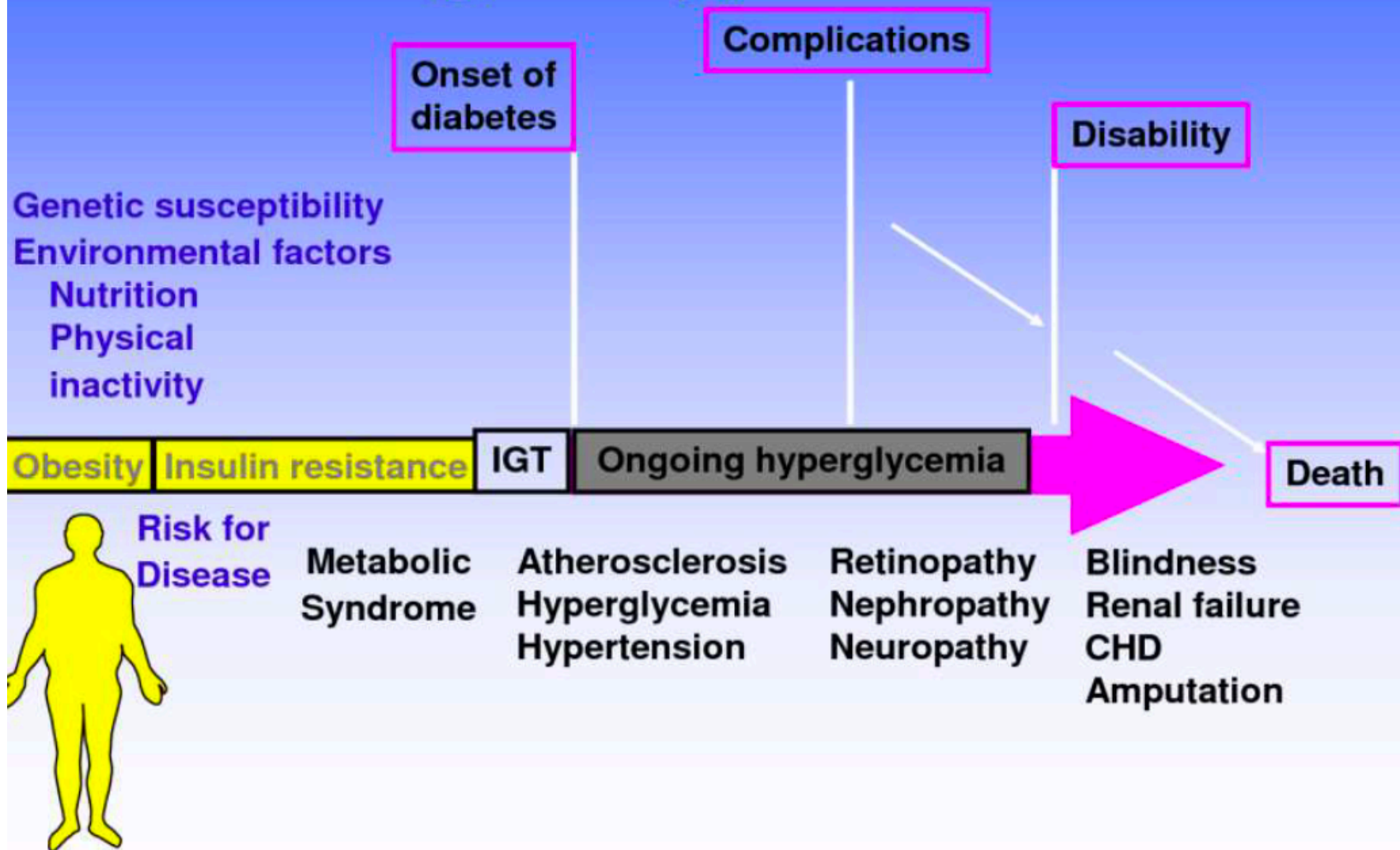


Symptomatic stage

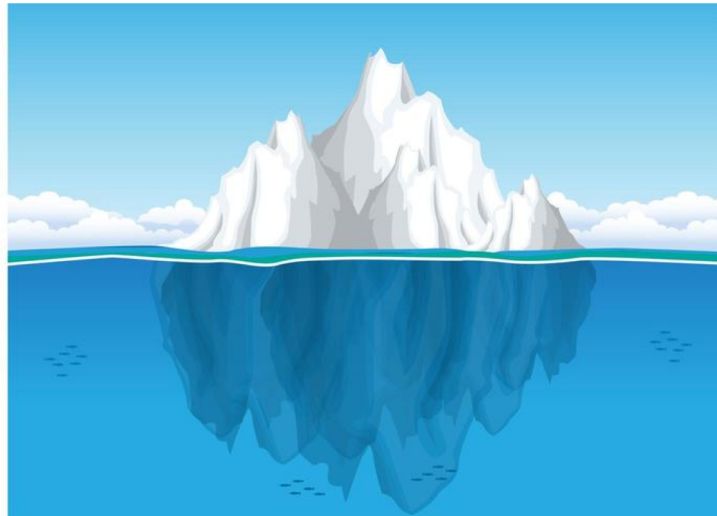
- When the disease is advanced enough to produce clinical manifestations
- The earlier the condition is diagnosed and treated, the more likely the treatment will delay death or serious complications, or at least provide the opportunity for effective rehabilitation.



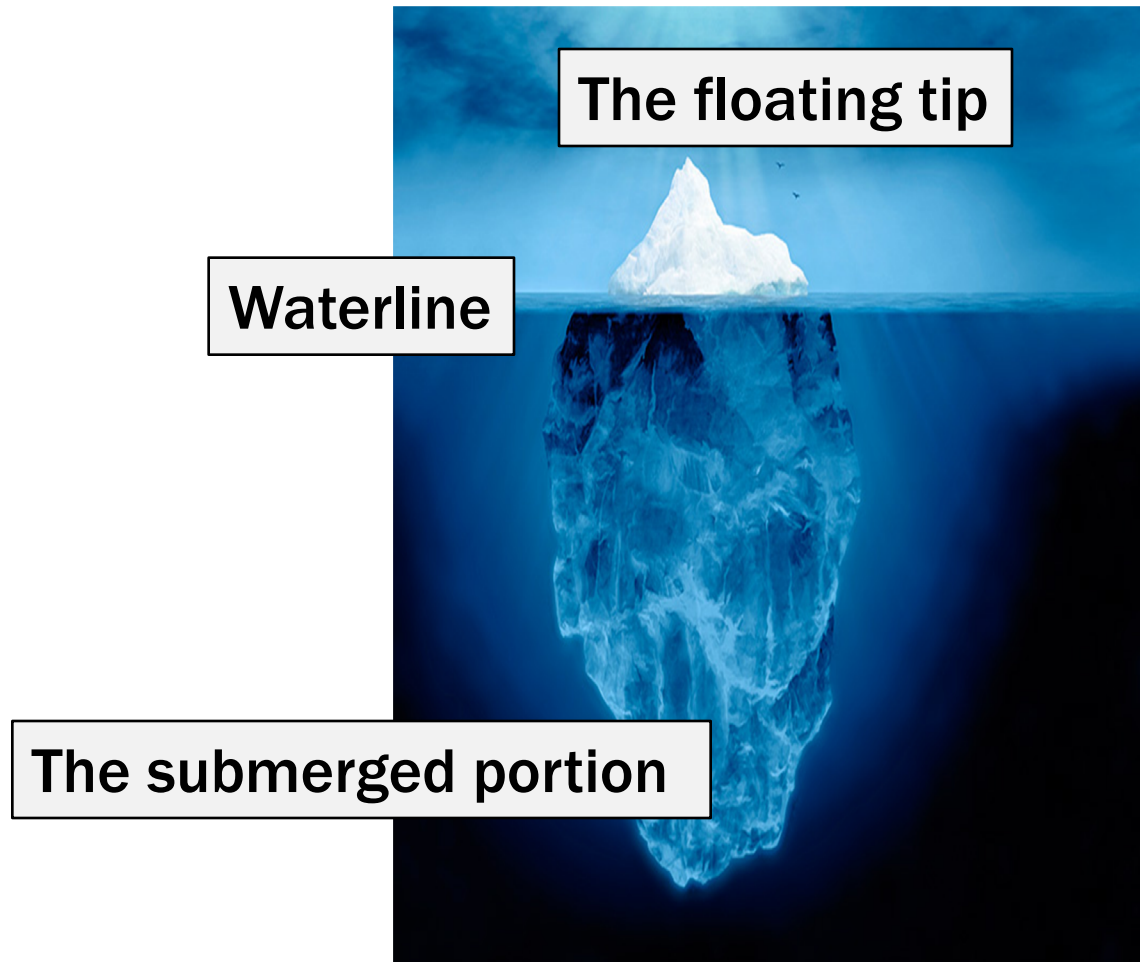
Natural History of Obesity Leading to Type 2 Diabetes



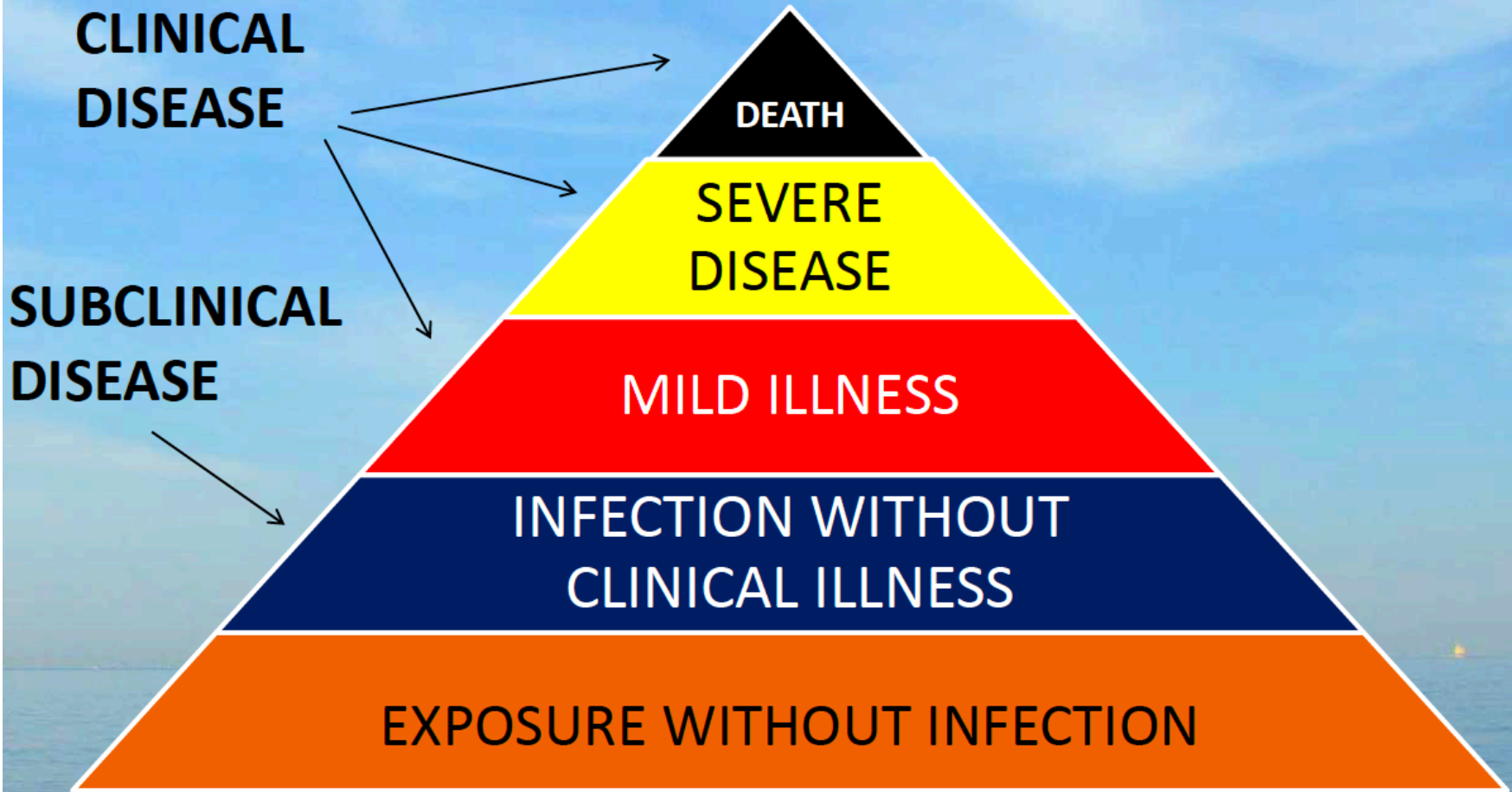
Iceberg Phenomenon



Iceberg of disease



ICEBERG CONCEPT OF DISEASE



Concept of Prevention



Disease Prevention

*Prevention is the process of **intercepting or opposing** the “cause” of a disease*

Successful prevention depends on:

- Knowledge of causation
- Dynamics of transmission
- Identification of risk factors and risk groups
- Availability of prophylactic or early detection and treatment measures
- Organization to apply these measures
- Continuous evaluation

Levels Of Prevention

There are three levels of prevention

- Primary prevention
- Secondary prevention
- Tertiary prevention

Primary Prevention

- It can be defined as “ **action taken prior to the onset of disease**, which removes the possibility that a disease will ever occur.
- keeps the disease process from becoming established by **eliminating causes of disease** or by **increasing resistance** to disease
- It signifies **intervention in the pre-symptomatic** phase of a disease.

Primary Prevention

Two types of strategies

- Health Promotion
- High risk strategy (Specific Protection)

Health Promotion

- Health-promoting activities usually contribute to the primary prevention of a variety of diseases and enhance a positive feeling of health
- These activities consist of **nonmedical efforts**,
 - changes in lifestyle,
 - nutrition, and
 - the environment.

Health Promotion

Health Promotion in Infectious Disease

- Reduced in frequency and seriousness of infectious Diseases
 - Clean water
 - Appropriate wastes disposal
 - Control the animal vectors of disease
 - Manage Crowding
 - Adequate housing and working environments

Example of Primary Prevention

Primary Prevention of Cardiovascular Disease

We need to address modifiable risk factors:

- Smoking
- Unhealthy diet
- Physical activity
- Dyslipidemia
- Hypertension
- Diabetes Mellitus
- Obesity

Secondary prevention

- Defined as “**action which stop the progress of a disease at its initial stage**”.
- Interrupts the disease process before it becomes symptomatic
- It is applied in the **latent** stage of disease.

Secondary prevention

- The specific interventions used is :
 - Early diagnosis and treatment.
- e.g. , **screening** for disease for breast cancer (using mammography) and cervical cancer (using pap smear).

Tertiary prevention

- limits the physical and social consequences of **symptomatic disease**
- These include **all measures undertaken when the disease has become clinically manifest or advanced**, with a view to
 - prevent or delay death,
 - reduce or limit the impairments and disabilities,
 - minimize suffering and
 - promote the subject's adjustment to incurable conditions.

Tertiary prevention

- **Tertiary prevention has two types of approaches**
 - disability limitation
 - rehabilitation.

Tertiary prevention

Disability Limitation

- These include all measures to prevent the occurrence of further complications, impairments, disabilities and handicaps or even death.

Examples

- Complete rest, morphine, oxygen and streptokinase is given to a patient of Acute MI, to prevent death or complications like arrhythmias / CHF.
- Application of plaster cast to a patient who has suffered Colle's fracture, is done to prevent complications and further disability like mal-union or non-union.

Levels of prevention

Table 14-1 Modified Version of Leavell's Levels of Prevention

Stage of Disease and Care	Level of Prevention	Appropriate Response
Predisease Stage		
No known risk factors	Primary prevention	Health promotion (e.g., encourage healthy changes in lifestyle, nutrition, and environment)
Disease susceptibility	Primary prevention	Specific protection (e.g., recommend nutritional supplements, immunizations, and occupational and automobile safety measures)
Latent Disease		
“Hidden” stage; asymptomatic disease	Secondary prevention	Screening (for populations) or case finding (for individuals in medical care) and treatment if disease is found
Symptomatic Disease		
Initial care	Tertiary prevention	Disability limitation* (i.e., institute medical or surgical treatment to limit damage from the disease and institute primary prevention measures)
Subsequent care	Tertiary prevention	Rehabilitation (i.e., identify and teach methods to reduce physical and social disability)



thank
you