INTERNATIONAL MEDICAL UNIVERSITY
MALAYSIA

Bachelor of Nursing
Year 1: Semester 2
BNU 2124 Immunology and Communicable disease in Nursing
Topic 1: Chain of Infection

Learning outcomes

At the end of the lesson, students will be able to:

1. Define terminology in communicable disease
2. Describe the body immune system
3. Explain 6 elements in the chain of infection
4. Explain mode and route of transmission
5. Explain the preventive measure for each type of transmission

Terminology in communicable disease

Infection

- An invasion and growth of microorganisms/**pathogens** in the body

Pathogen

microorganism that can cause illness.

Non-pathogen

Microorganism that not cause illness (eg: normal flora)

Terminology cont…

Disease

Any ***harmful deviation*** from the normal structure or functional state of an organism

A study of diseases is called **pathology**

- causes - etiology
- how it develop - pathogenesis
- structural changes - morphological changes
- functional changes
- treatment

Terminology cont…

Communicable Disease

An **illness caused by an infectious agent** can be transmitted from person to person or from animal to person

Outbreak

A sudden increase in occurrence – war/disease

Occurrence of cases of diseases **in excess** in a **defined community**

Terminology cont..

Epidemic

- **unexpected increase** in the number of disease cases in a **specific geographical area**
- **does not** necessarily have to be contagious

  eg: polio, smallpox, measles
- can also relate to health behavior – eg: obesity, smoking

Endemic

- disease outbreak when it is **consistently present** but **limited** to a particular region
- the **disease spread** and rates predictable

  eg: dengue, malaria

Terminology cont..

Pandemic

- disease's growth is **rapid**
- each day cases **grow more** than the day prior
- virus covers a **wide area**, affecting several countries and populations

Eg: Covid-19 (2019- present endemic)
Spanish Flu (1918-1920)
Asian Flu (1957-1958)

Terminology cont..

Agent

A disease-producing **organism** or substance

Fomite

Contaminated **objects or materials** that can cause the spreading of diseases such as clothes, utensils, and furniture

Host

The living body upon which a parasite or infectious agent lives

Carrier

an individual who carries infectious agent and may not display **disease** symptoms

Stages of disease cont..

Incubation Period

The **period** of **exposure** to pathogen and appearance of the **first symptoms**

Prodromal period

Stage in which **early signs and symptoms** of disease appears but are **not yet clinical specific/severe**

Illness period

Shows **apparent symptoms** of the disease

Convalescent period

Symptoms **resolve**, **normal function** returns

Body Immune system

Introduction

- The immune system in our body provides protection from the entry of microorganism and eliminate death and damage cells

- Lymphoid organs – bone marrow, thymus, spleen etc
- WBC, Antibodies

- Immunity – the ability of the body to protect against foreign bodies – bacteria, virus, toxic substance

- Lack of immunity – susceptibility

Types of infection

- Endogenous
- own body bacteria – perforated bowel
- autoimmune

- Exogenous
- Pathogenic organism enters the body from the environment
- contaminated devise - HCW

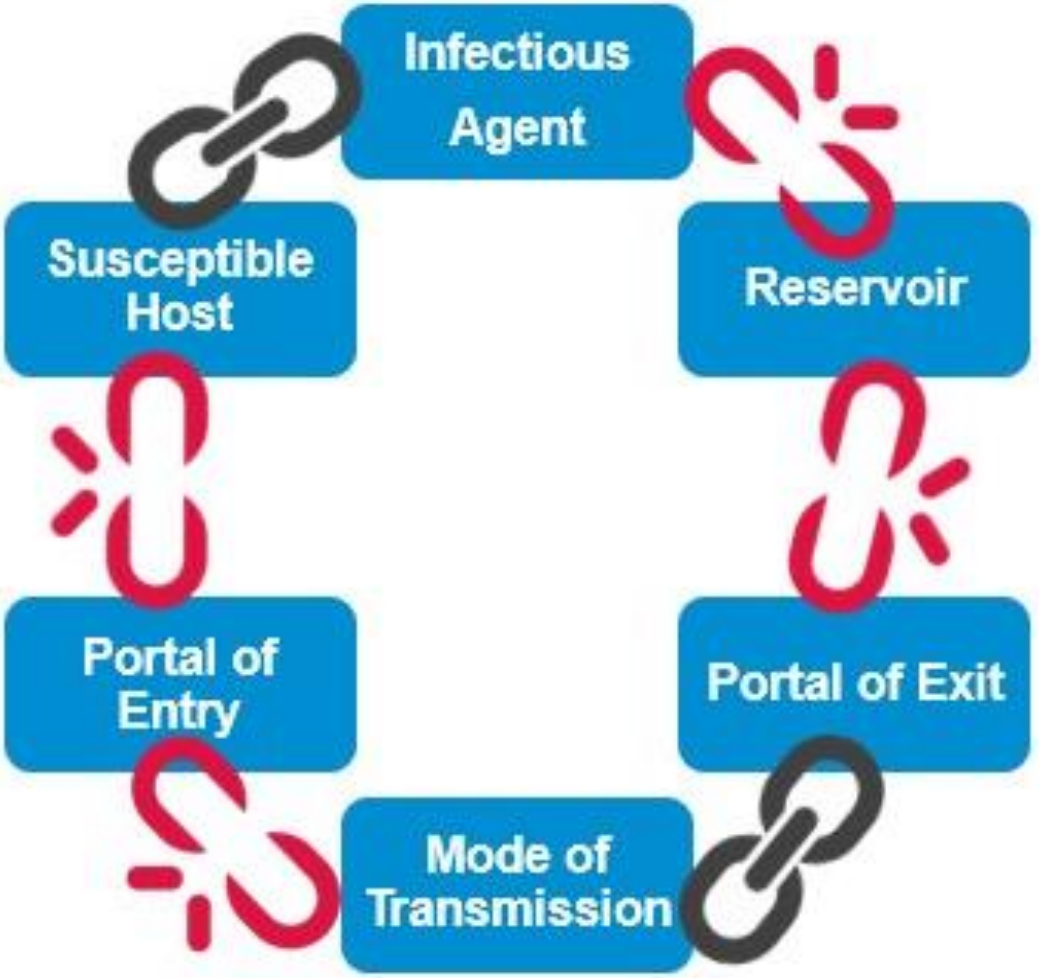
- Nosocomial infection / Healthcare-associated infection/**Hospital-acquired infection (HAI)**

- infection acquired by a person in the healthcare setting

- not present during the time of admission

- manifest 48 hours after admission or after discharge

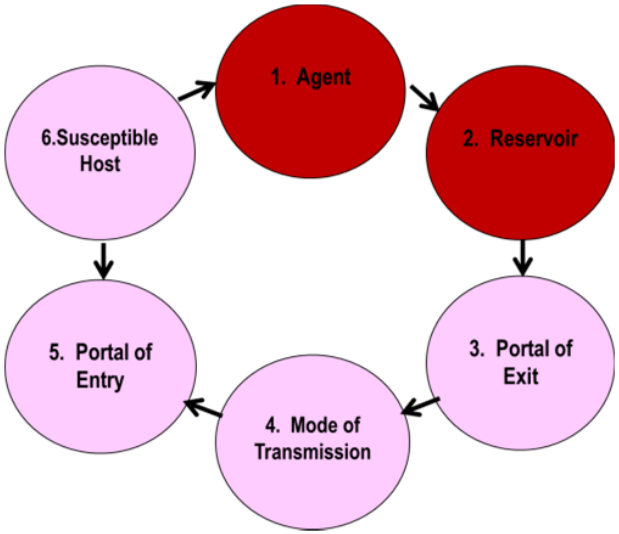
Chain of Infection



1. Infectious agent

- microorganisms that are responsible for causing disease

- Viruses
- Bacteria
- Fungi
- Protozoa and Helminthes
- Parasites



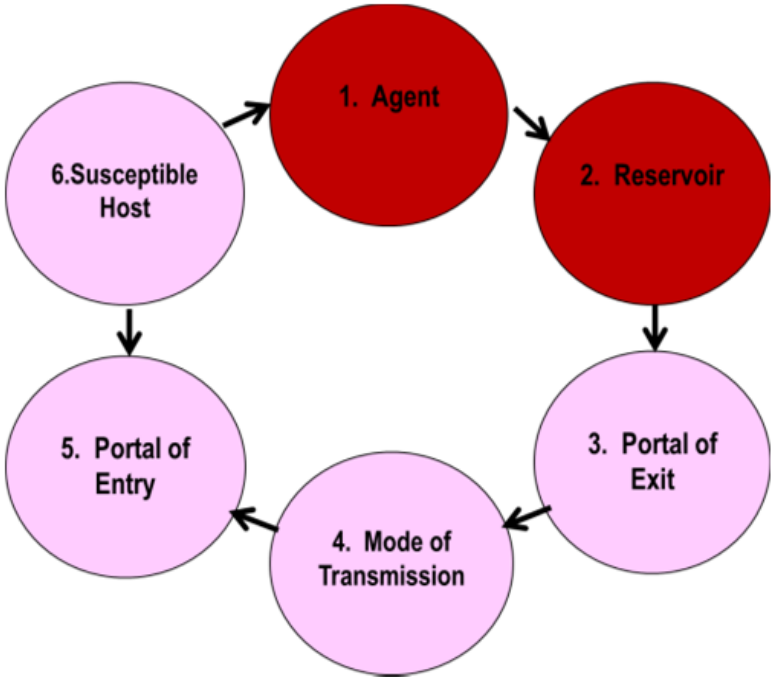
2. Reservoir

The reservoir is where the infectious agent normally lives and multiplies

Types of reservoirs:

- Animate
- humans, insects, bird

- Inanimate -environmental
- soil, water, food, feces, fomites objects



3. Portal of exit

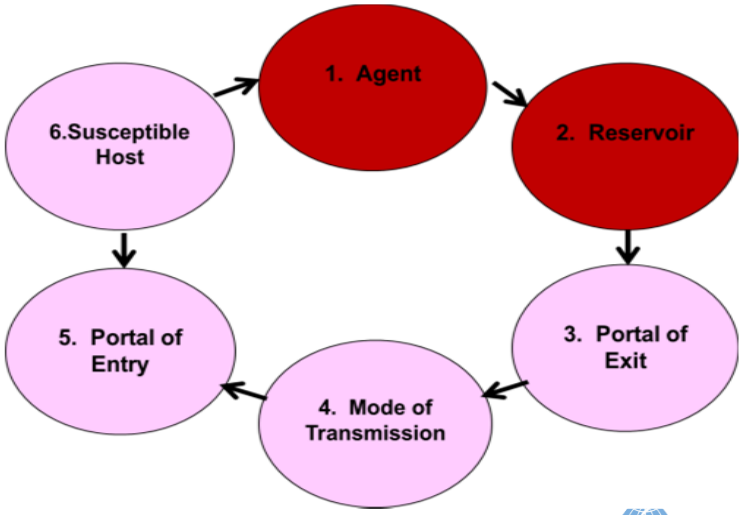
- the route an infectious agent leaves the host
- the common cause of disease transmission

  Respiratory tract – coughing, sneezing

  Gastro-intestinal tract - feces

  Skin lesions

  Blood

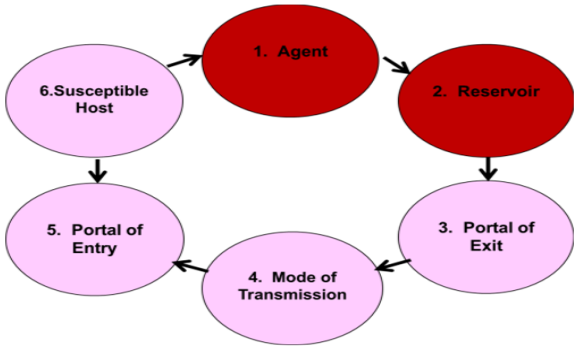


4. Mode of Transmission

Contact transmission : Physical contact between infected person/contaminated object with another person

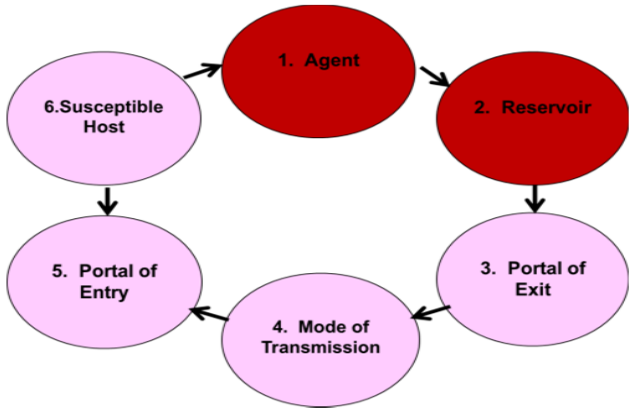
Direct contact – person to person

- Skin-to-skin contact, kissing, and sexual intercourse
- Touches contaminated body fluid



Droplets – (large droplets)

- Transmission by a direct spray of relatively large, short-range drops over a few feet, before the droplets fall to the ground
- Produced by sneezing, coughing, or talking - enters eyes, nose, mouth



Airborne transmission

- small droplet form droplet nuclei- aerosol
- airborne droplets nuclei – small (<5mm)
- can stay airborne for hours and disperse by air current
- risk air in the room can be contaminated

- Dust particles: Dust may contain agents

- Inhaled into a person's respiratory system
- Eg: tuberculosis, chicken pox

Indirect contact

- transmission of an agent from a reservoir to a susceptible host through suspended particles, vehicles or vectors

Vectors: infectious agent is carried from a reservoir to a susceptible host by a living intermediary

eg. insects such as mosquitoes, fleas, and ticks

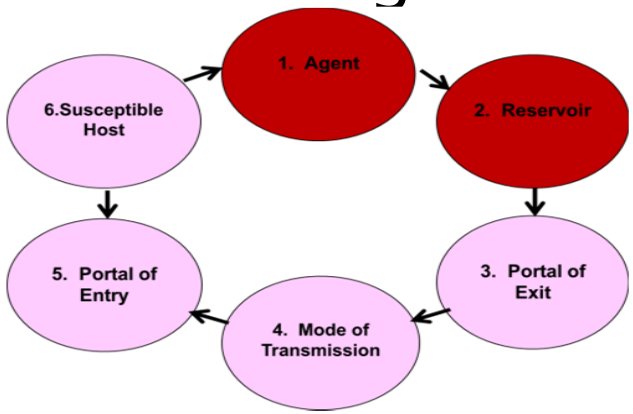
Vehicles: infectious agent is carried from a reservoir to a susceptible host by a non-living intermediary

eg. contaminated food, water, biologics (blood products), and fomites (inanimate objects such as medical equipment, surfaces), soil

5. Portal of entry

- An agent enters a susceptible host through a portal of entry

- The portal of entry provides a site for the agent to multiply or for toxins to act



Incubation Period:

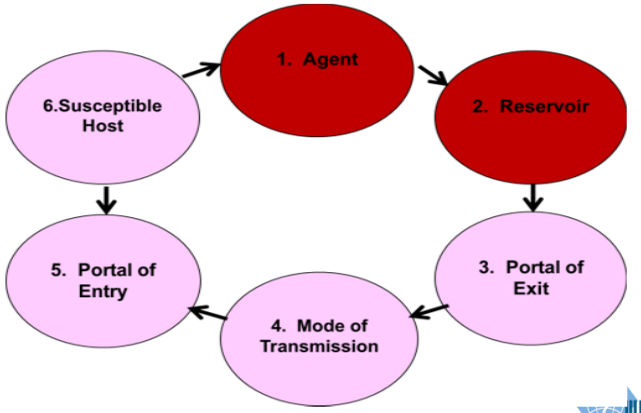
- The period from exposure to infection to the onset of symptoms or signs of infectious disease

- The length of the incubation period depends on:
  - the portal of entry
  - dosage of the infectious agent
  - rate of growth of the organism in the host
  - host resistance

6. Susceptible Host

- The host is a person or other living organism that can be infected by an infectious agent under normal conditions

- Susceptibility of a host depends on:
- General factors
- Genetic factors
- Specific acquired immunity



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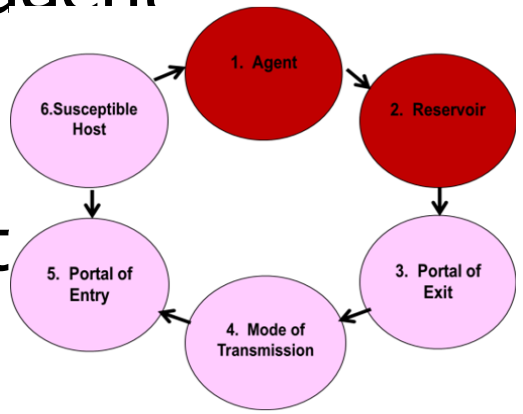
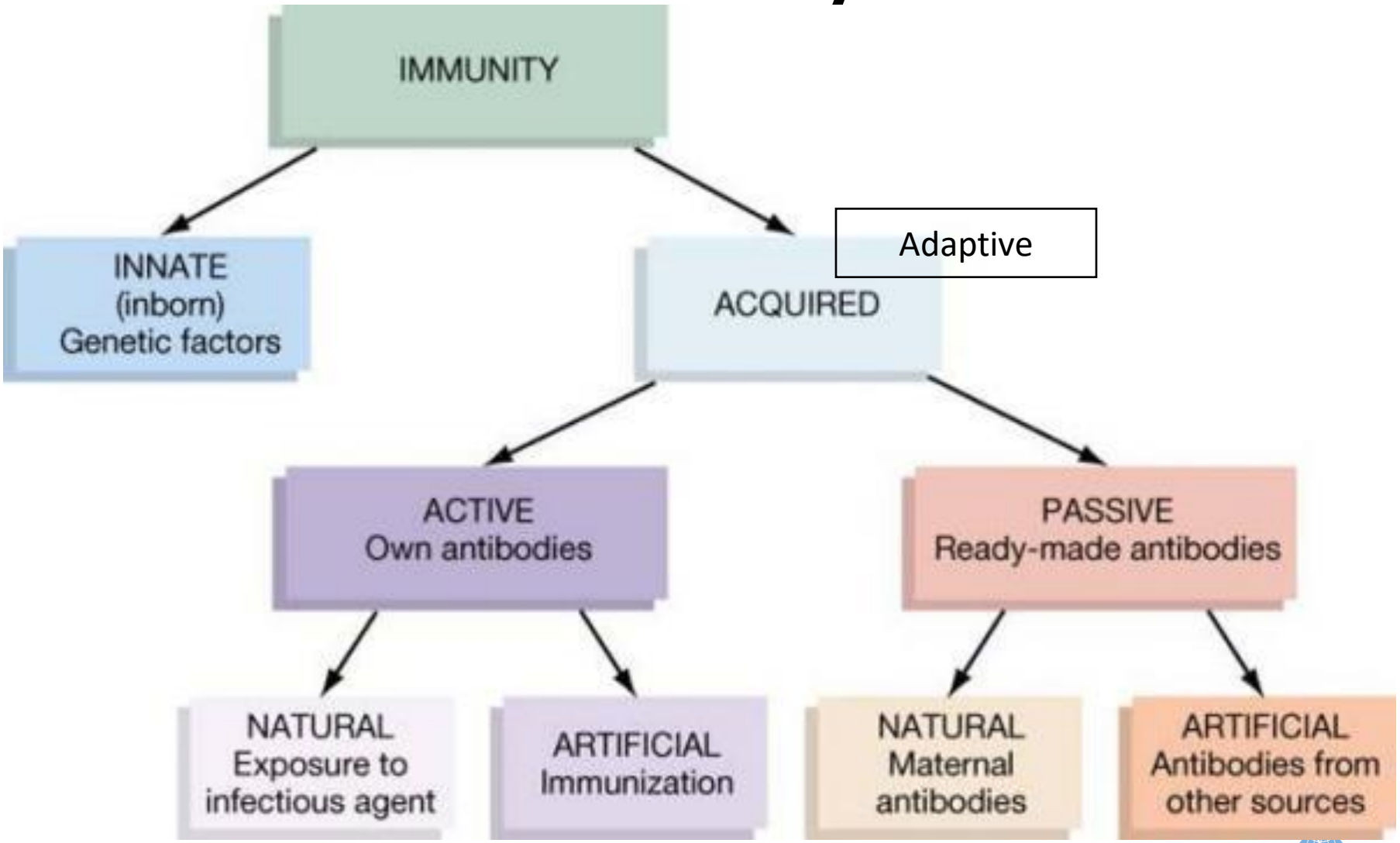


- Factors that may increase susceptibilit
  - Age
  - Comorbid/underlying disease
  - Nutritional status
  - Immune competency
    drug treatment - cortisone, cytotoxic drugs

The Immune System



NON-SPECIFIC DEFENCES (INNATE IMMUNITY)

First line of defense	Second line of defense
• Skin • Mucous membranes • Secretions of skin and mucous membranes	• Phagocytic leukocytes • Antimicrobial proteins • Inflammatory response • Fever

Adaptive immunity

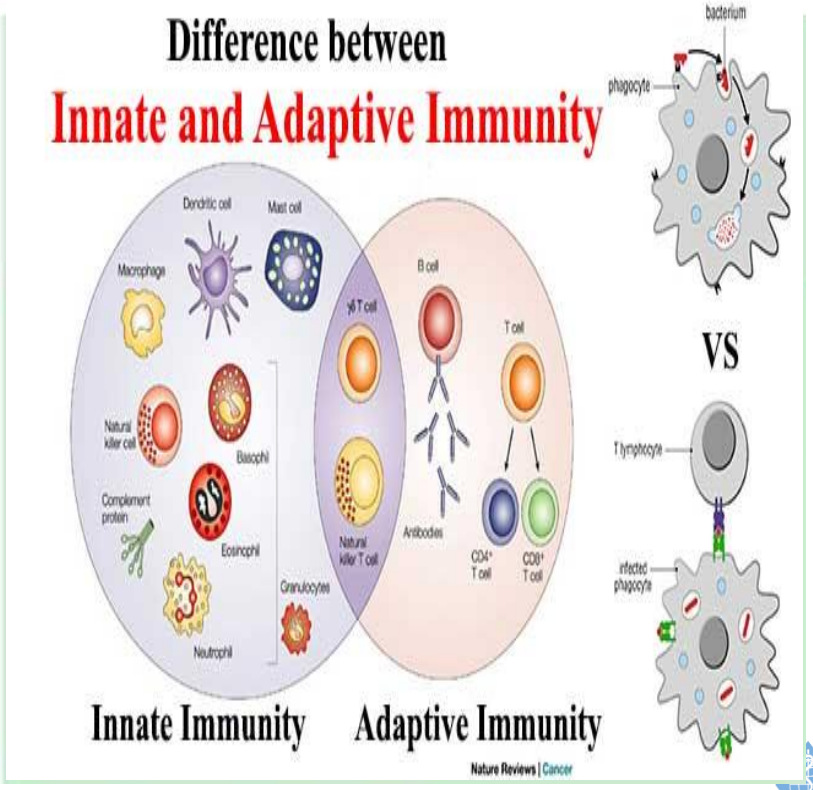
Naturally acquired

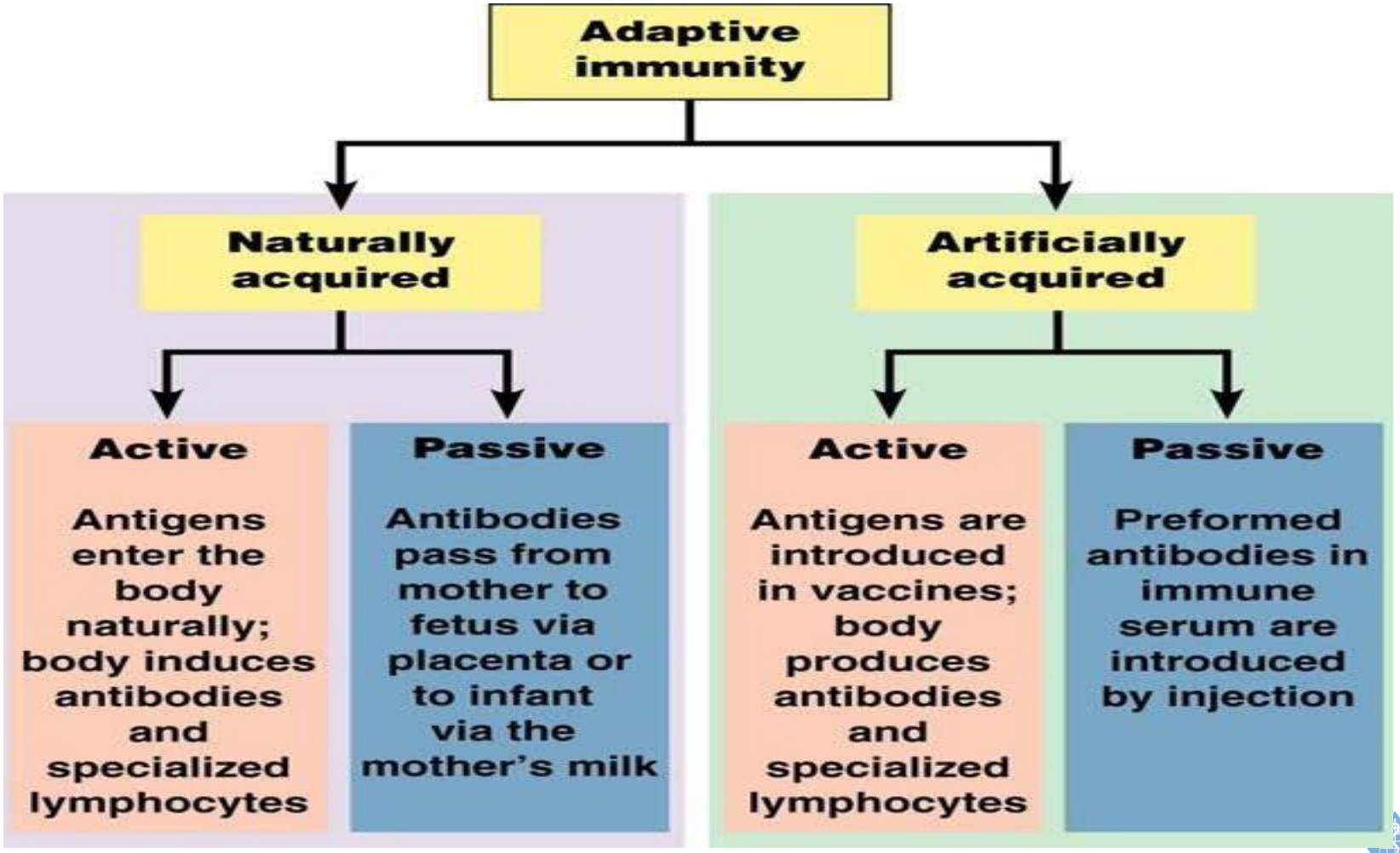
Active

Antigens enter the body naturally; body induces antibodies and specialized lymphocytes

Passive

Antibodies pass from mother to fetus via placenta or to infant via the mother's milk




Adaptive immunity
Naturally acquired
Artificially acquired
Active
Antigens enter the body naturally; body induces antibodies and specialized lymphocytes
Passive
Antibodies pass from mother to fetus via placenta or to infant via the mother's milk
Active
Antigens are introduced in vaccines; body produces antibodies and specialized lymphocytes
Passive
Preformed antibodies in immune serum are introduced by injection

Herd Immunity and Susceptibility

- is the state of immunity of a group

"The resistance of a group to invasion and spread of an infectious agent, based on the immunity of a high proportion of individual members of the group"

- The likelihood that an infected person will encounter a susceptible person is small once a high proportion of all people in the community are immune

Susceptible Host

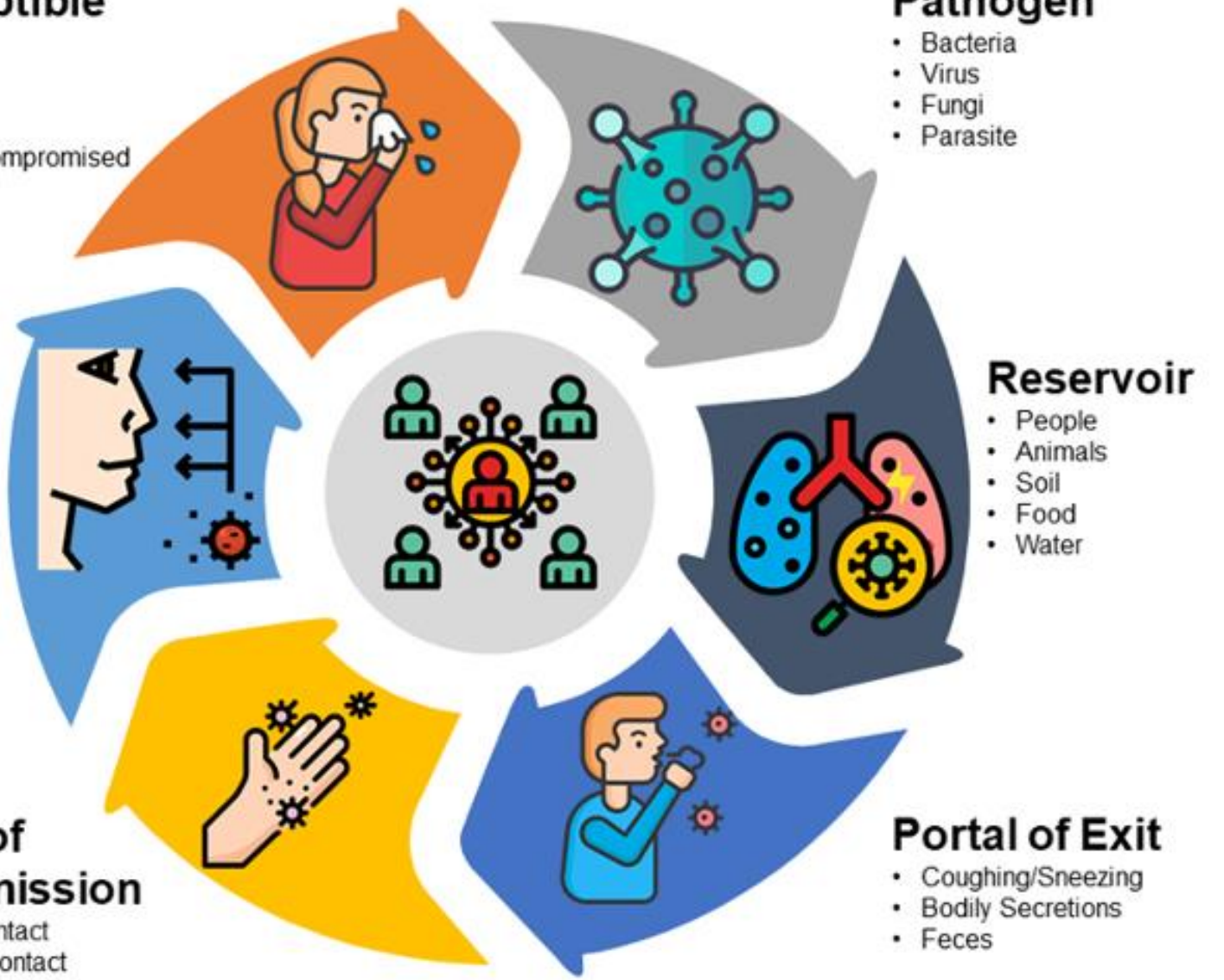
- Elderly
- Infants
- Immunocompromised
- ANYONE!

Pathogen

- Bacteria
- Virus
- Fungi
- Parasite

Portal of Entry

- Mouth
- Nose
- Eyes
- Cuts in skin



Reservoir

- People
- Animals
- Soil
- Food
- Water

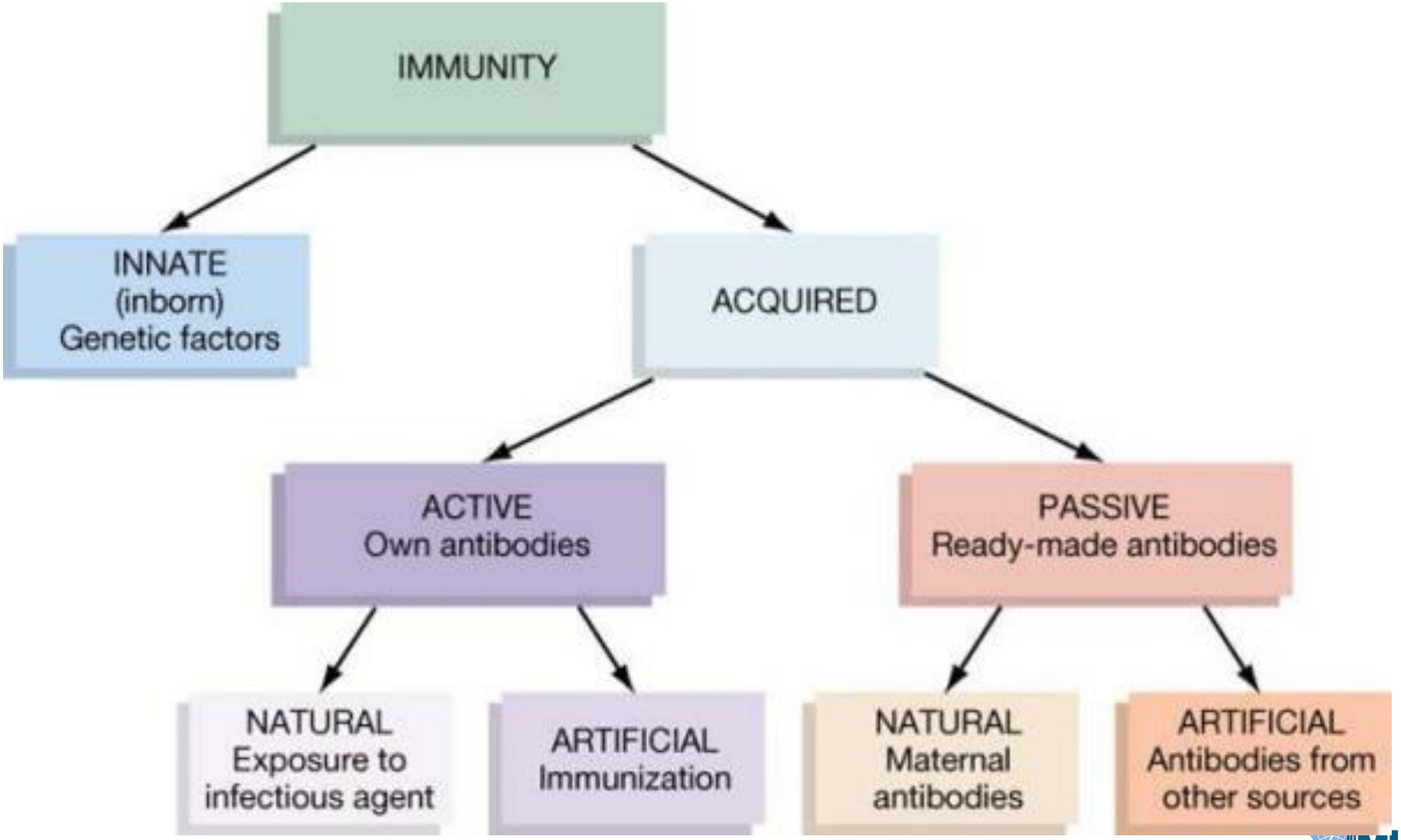
Mode of Transmission

- Direct Contact
- Indirect Contact
- Vectors

Portal of Exit

- Coughing/Sneezing
- Bodily Secretions
- Feces

Specific acquired immunity
Type of body immunity



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