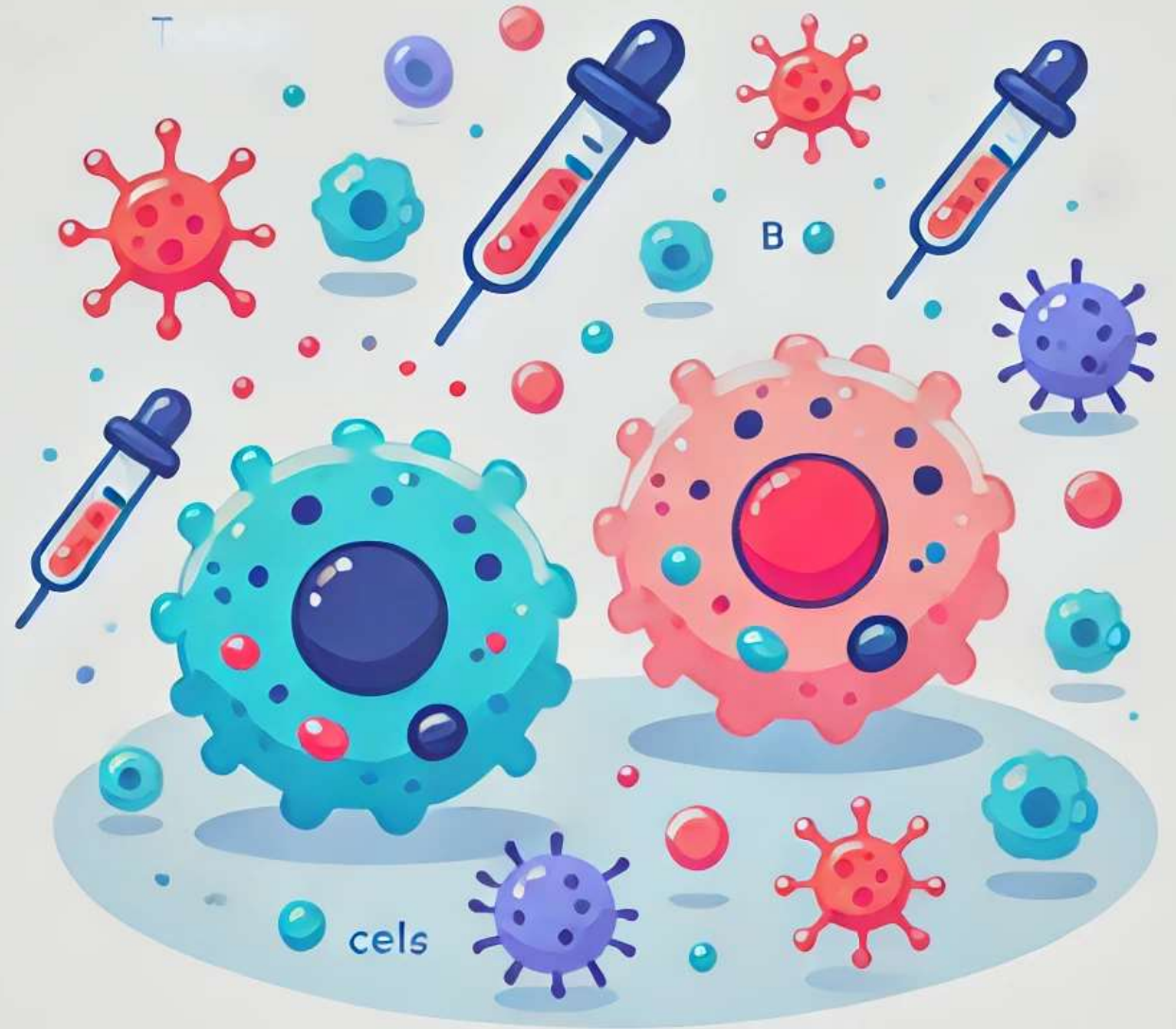


Humoral immune responses

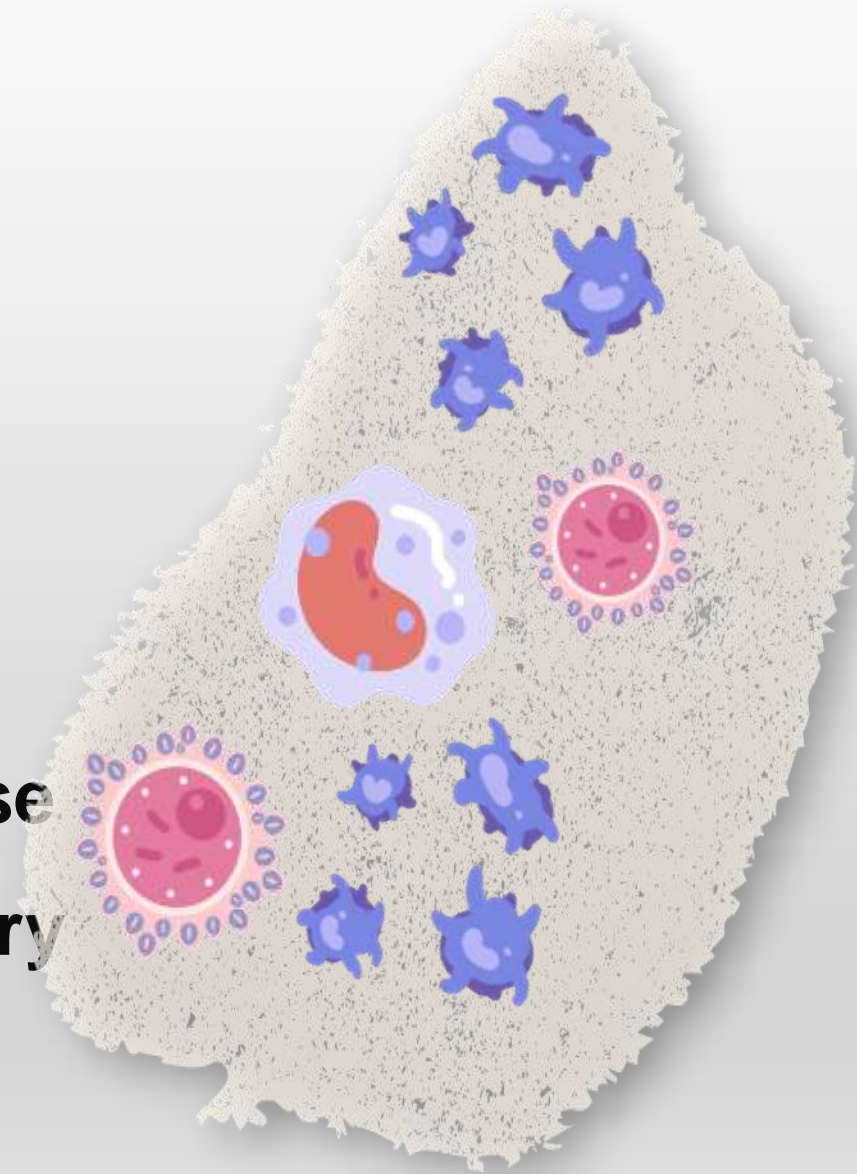
Group **A**

- Sama Mohammed 4986
- Aisha Al Fakhri 3966
- Salha Elshwihdy 3491
- Reem Mohamed 4506



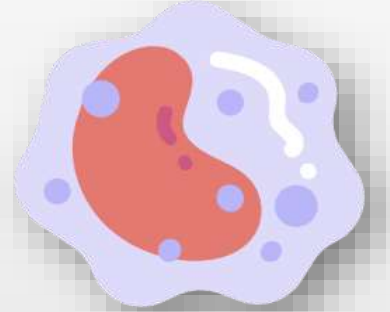
Objectives

- 1) Introduction
- 2) What is the humoral immune response?
- 3) Describe the primary immune response
- 4) Describe the secondary immune response
- 5) Factors that affecting on humeral response
- 6) Related diseases to primary and secondary immune response
- 7) Summary



Introduction

The immune response

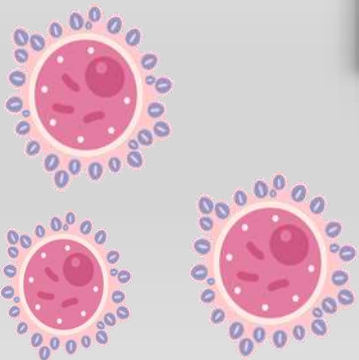


1) Innate immune responses

- **First** line of **defense**
- Cells :
Neutrophils , Monocytes ,
Eosinophils , Basophiles

2) Adaptive immune responses

- **Follows** innate response
- Target **specific** pathogens
- Produces antigens- **specific memory**
- Cells: **T** lymphocyte and **B** lymphocyte
 - Humoral response
 - Cell mediated immunity



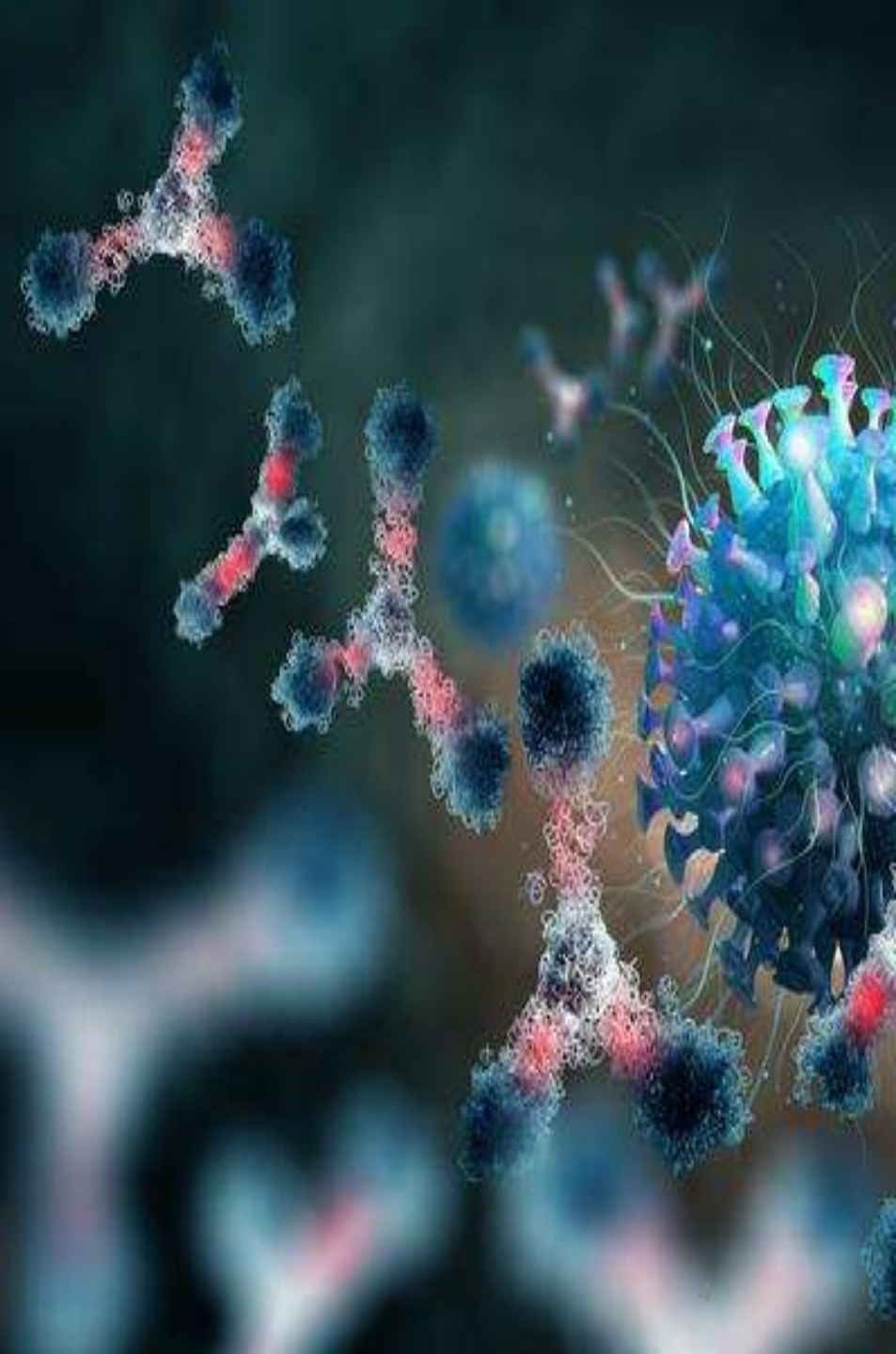
What is the humoral immune response?

- The humoral immune response is a part of the **adaptive** immune system that involves the production of antibodies by **B cells** to **neutralize** and **eliminate** pathogens like bacteria and viruses present in body.

**Humoral
response**

Primary immune response

Secondary immune response



Primary humoral immune response

The primary humoral immune response is the body's **first** reaction to a **new** antigen , humoral immune response is a part of the adaptive immune system where **B cells** produce antibodies to target pathogens like bacteria and viruses **found** outside cells in body fluids.

Stages of primary humoral immune response

01

Antigen
recognition

02

B-Cell Binding

03

Clonal expansion

04

Lag phase

05

Differentiation

06

Antibody production

Stages of the primary immune response

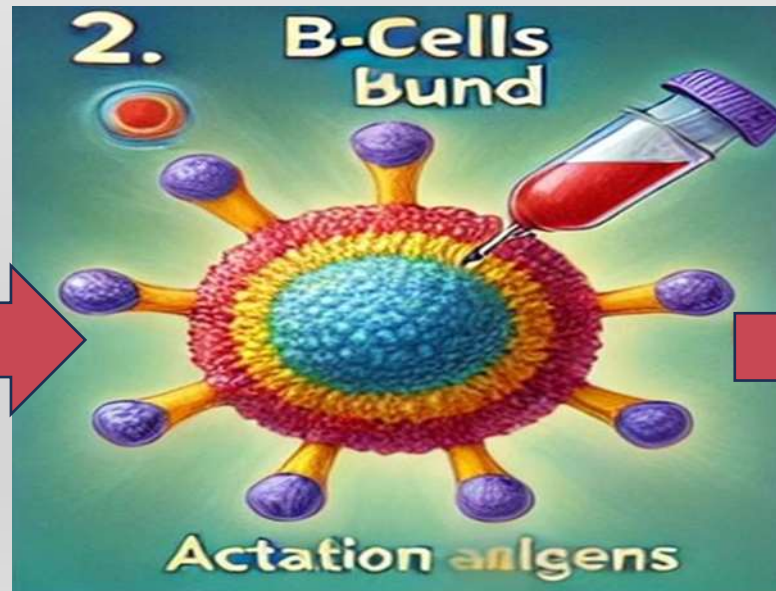
Antigen Recognition

B-cells detect the antigen



B-Cell Binding

The antigen binds to B cell receptors (BCRs) and is activated with the help of **(helper T cells)**.



Clonal Expansion

B-cells proliferate to target the antigen



Stages the primary immune response

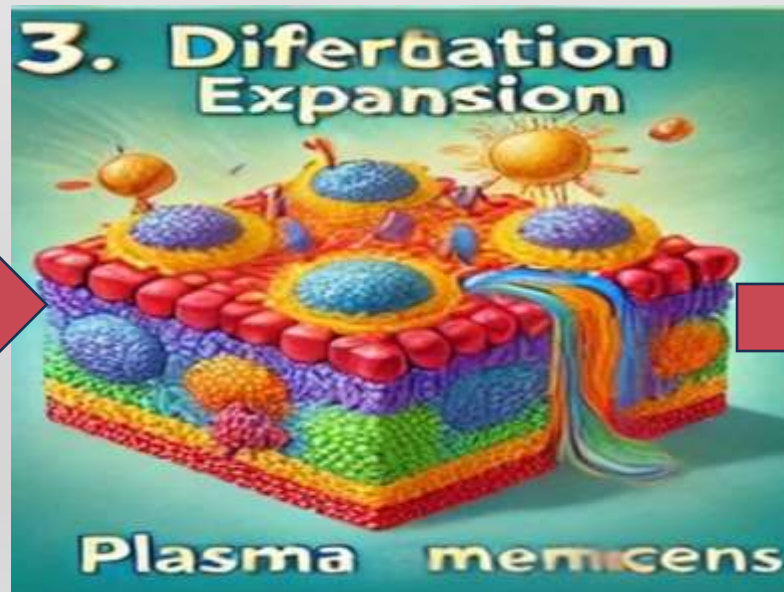
Lag phase

A delay before antibody production starts.



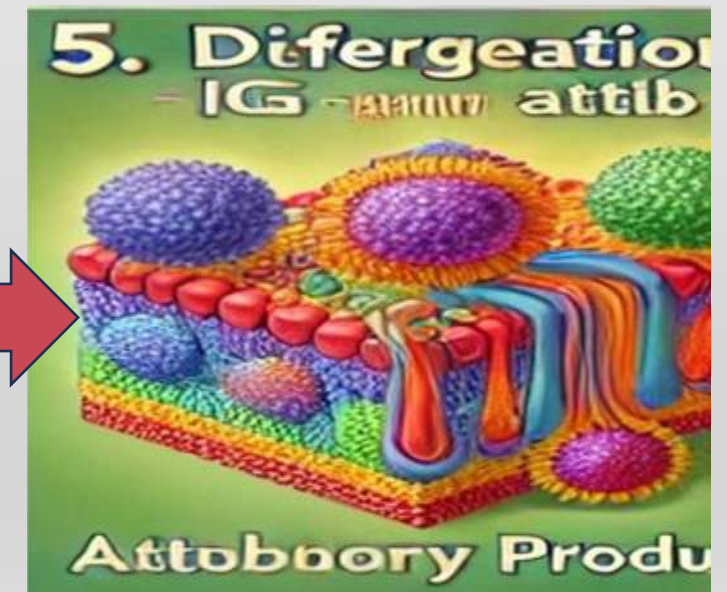
Differentiation

B-cells become plasma cells (produce antibodies) and memory cells (remember the antigen).



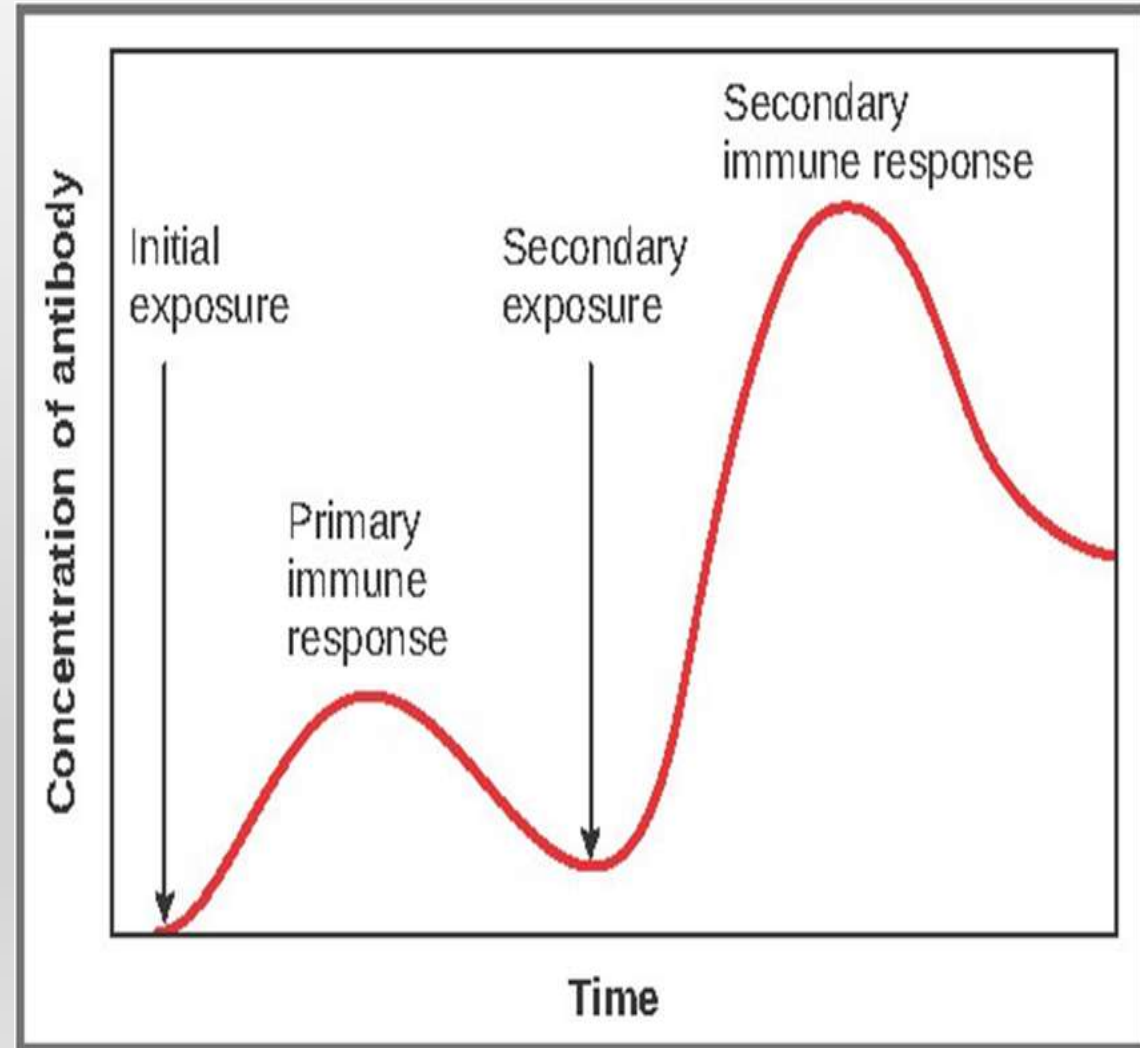
Antibody Production

First IgM, then IgG.



secondary immune response

The **secondary** humoral response refers to the body's immune reaction when it encounters a pathogen for the second time. This response is **faster, stronger, and more effective** than the primary response, due to the presence of **memory B cells** that were generated during the initial exposure.



Stages of the secondary immune response

01

Memory Cells

02

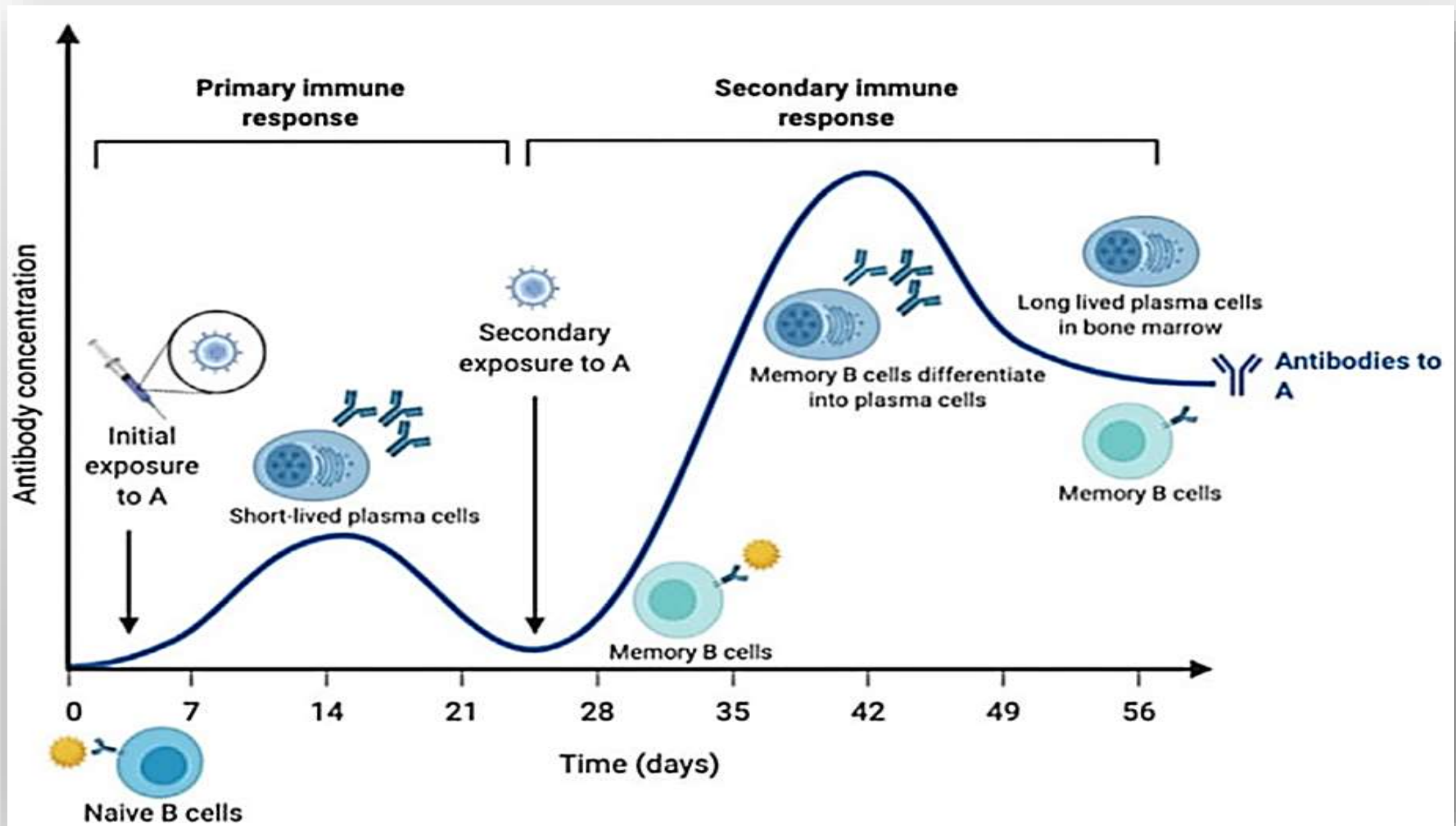
Faster Response

03

Higher Antibody Titers

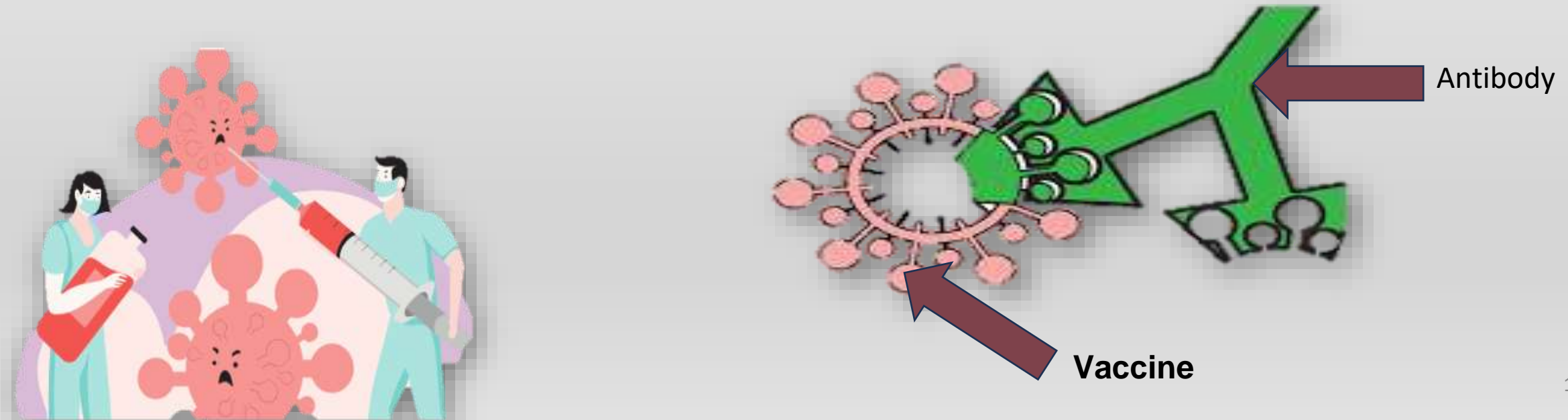
04

**Isotype Switching
and Affinity
Maturation**



Vaccines hypothesis

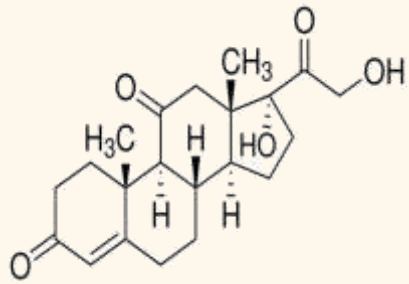
The secondary response provides more efficient and durable protection against pathogens that the body has encountered previously. This is the basis of how vaccines work: by exposing the immune system to an antigen without causing disease, they prime the immune system to respond rapidly and effectively to future infections by the same pathogen



Factors that affecting on humoral response

1) Immune suppressor drugs

- Cortisone inhibit the humoral immune response



- For protecting the donated or transferred organs



2) Route of administration :

- Oral VS intravenous

Oral no need to immune response as much as IV

Cause antigens will ended up excreted in urine by kidney

More complex process due to fast blood circulation which required T and B cell attacking



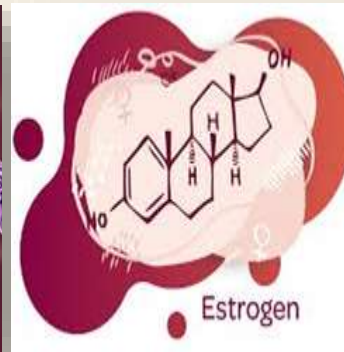
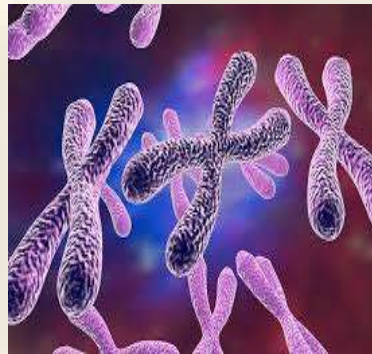
Factors that affecting humoral response

3) Dosa of antigen :



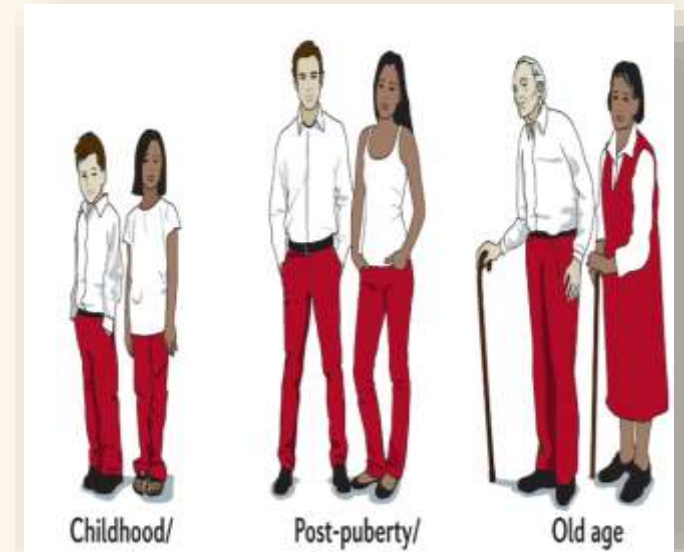
4) Sex :

- Females have immune response stronger than males
- Why?
- Because of **Estrogen** promoting for **T** and **B** cell activation
- Also due to two **X genes**



5) Age:

- Old people and very young children have weaker or lower immune response



Related diseases to primary and secondary immune response

Related to Primary immune response

Chronic Infections

Due to Primary Immune Dysfunction , slow respond to an infection, the body may not clear the pathogen leading to chronic infections

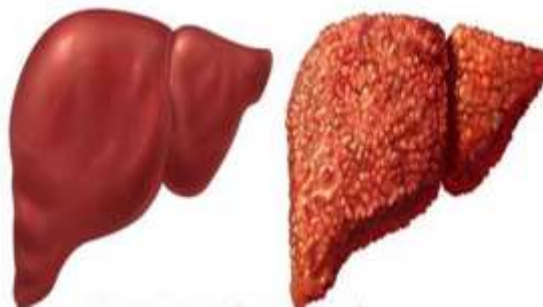
- **HIV/AIDS:**

attacks CD4+ T cells,
leading progressive
immunodeficiency.



- **Hepatitis B and C:**

with a weak primary immune response , the body
may fail to clear the virus leading chronic infection
and damage to liver



Hepatitis B



Hepatitis C

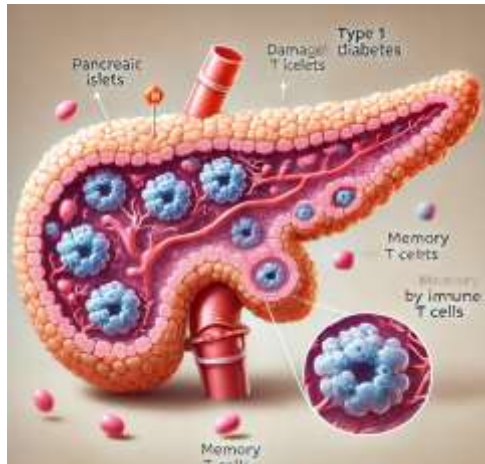
Related diseases to primary and secondary immune response

Related to secondary immune response

- **Autoimmune Diseases**

Dysregulation lead to mistakenly attacking the body's own tissues.

Type 1 Diabetes:
Memory T cells attack pancreatic β -cells



Rheumatoid Arthritis:
Chronic inflammation and tissue damage in joints



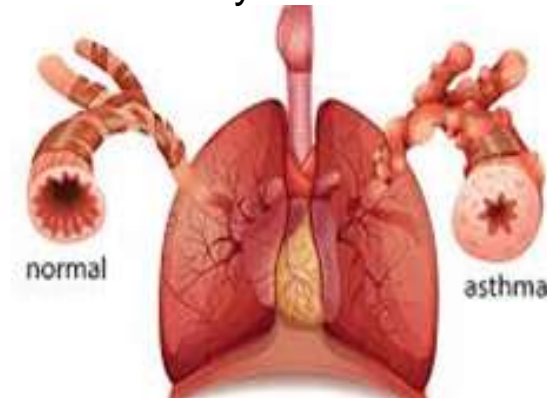
- **Allergic Reactions (Hypersensitivity)**

Overdone secondary immune responses to harmless Ag involving **IgE** abs and memory immune cells.

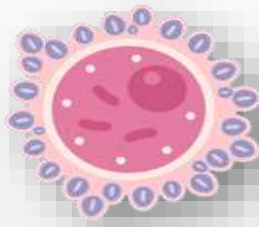


Asthma:

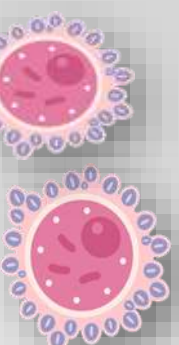
Repeated exposure to allergens leads to chronic inflammation and airway obstruction



Summary



	Primary immune response	Secondary immune response
Incubation	long 4 to 7 days	Shorter 1 to 3
Peak response	Smaller	Higher
Antibody Class	IgM, then IgG	IgG, sometimes IgE, and IgA
Antibody Affinity	Lower	Higher
Antigen concentration	needs higher to induce response	Needs lower to induce response





1. Which route of administration, where it is not need to the humoral immune response ?

- **Oral**
administration

2. Which antibody involved in allergic reactions?

- **IgE**



References :

- Murphy, K., Weaver, C. (2016). *Janeway's Immunobiology* (9th ed.). Garland Science.
- Kumar.S, (2016), *Essential of medical microbiology*.
- "Basic Immunology: *Functions and Disorders of the Immune System*" by Abul K. Abbas