IMMUNOGLOBULINS

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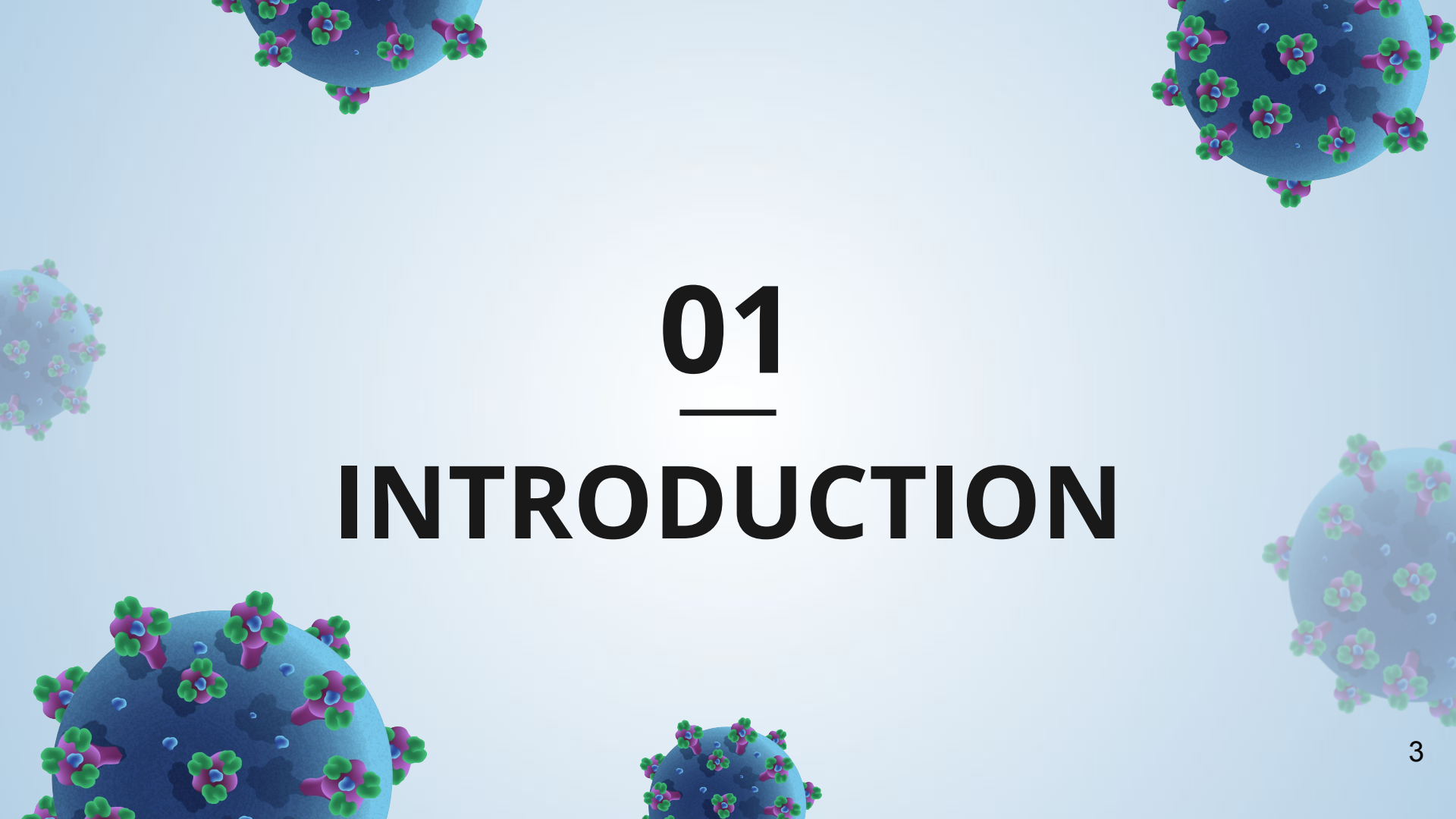

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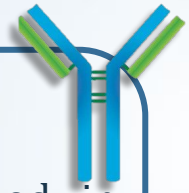
INTRODUCTION

WHAT IS IMMUNOGLOBULINS?

Immunoglobulins (Ig) also known as antibodies, are essential proteins produced by the immune system to help identify and neutralize harmful agents such as bacteria, viruses, and toxins They are primarily produced by plasma cells, a (type of white blood cell), and play a key role in defending the body against infections.

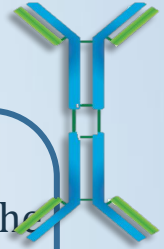
Classes of Immunoglobulins

There are five main classes of immunoglobulins, each with distinct functions:



IgG

The most abundant antibody in the bloodstream, IgG provides long-term protection and can cross the placenta to protect the fetus.



IgA

Found in mucosal areas (like the gut and respiratory tract) and in secretions (such as saliva, tears, and breast milk), IgA plays a critical role in mucosal immunity.

IgM

The first antibody produced in response to an infection, IgM is effective at forming complexes with pathogens and activating complement.

IgD

Present in small amounts in the blood, IgD's exact function is less understood, but it plays a role in the activation and regulation of B cells.

IgE

Involved in allergic reactions and responses to parasitic infections, IgE binds to allergens and triggers histamine release from mast cells.

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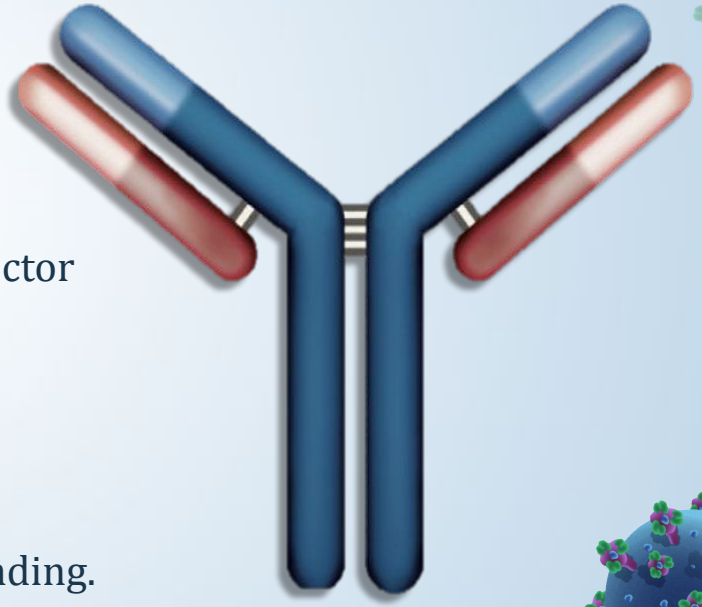
STRUCTURE OF IMMUNOGLOBULINS

STRUCTURE

1. HEAVY CHAINS

These determine the antibody class (IgA, IgD, IgE, IgG, IgM) and have:

- Variable Region (VH): Responsible for antigen binding.
- Constant Region (CH): Defines the antibody's effector functions.



2. LIGHT CHAINS

Two types (kappa and lambda) with:

- Variable Region (VL): Also involved in antigen binding.
- Constant Region (CL): Contributes to the antibody's structure.

STRUCTURE

3. HINGE REGION:

Present in some antibodies, allowing flexibility in antigen binding.

4. FAB & FC REGIONS:

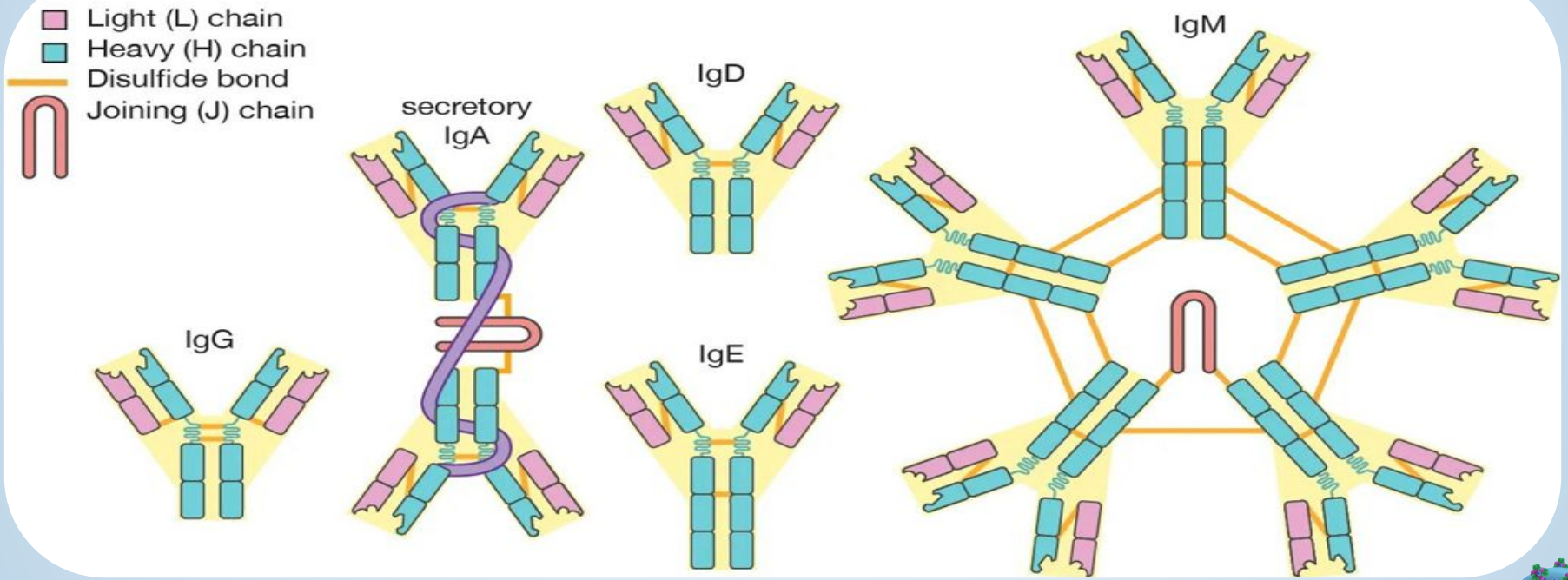
- Fab: Binds antigens.
- Fc: Interacts with immune cells.

5. GLYCOSYLATION:

Carbohydrate groups attached to the immunoglobulin influence stability and function.

These structures allow immunoglobulins to recognize diverse antigens and trigger immune responses.

STRUCTURE


Light (L) chain
Heavy (H) chain
Disulfide bond
Joining (J) chain
IgG
secretory IgA
IgD
IgE
IgM

03

FUNCTION OF IMMUNOGLOBULINS

FUNCTIONS

Immunoglobulins, also known as antibodies, play several crucial roles in the immune system. Here are four key functions:

1) NEUTRALIZATION

Immunoglobulins can bind to pathogens (like viruses and bacteria) and neutralize their ability to infect cells. This prevents the pathogens from causing disease.

2) OPSONIZATION

Antibodies can coat pathogens, marking them for destruction by phagocytes (such as macrophages and neutrophils). This process enhances the efficiency of phagocytosis.

FUNCTIONS

3) ACTIVATION OF COMPLEMENT SYSTEM

Certain immunoglobulins (especially IgM and IgG) can activate the complement system, a group of proteins that assists in destroying pathogens by promoting inflammation, attracting immune cells, and directly lysing cells.

4) ANTIBODY-DEPENDENT CELL-MEDIATED CYTOTOXICITY (ADCC):

Immunoglobulins can bind to infected or cancerous cells and recruit immune cells (like natural killer cells) to destroy these target cells.

These functions help protect the body against infections and contribute to overall immune defence.

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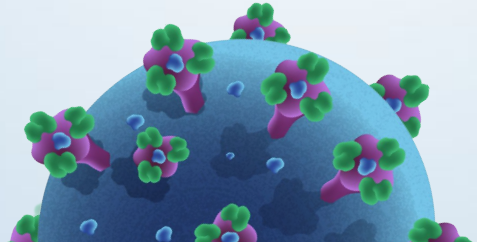
CLINICAL IMPORTANCE

Clinical Importance of Immunoglobulins

The clinical importance of immunoglobulins (Ig) lies in their essential role in both diagnosing and treating a wide range of immune-related disorders.

1) Treatment of Hyperimmune States

In cases where excessive or aberrant immune activation is present (e.9., autoimmune hemolytic anemia), immunoglobulin therapy can help suppress excessive immune responses and prevent damage to body tissues.



Clinical Importance of Immunoglobulins

2)Post-transplantation Care

In patients undergoing organ transplants, immunoglobulin therapy can be used to modulate the immune system and reduce the risk of infection or organ rejection, especially in the early post-transplant period.

3) Management of Chronic Inflammatory and Autoimmune Conditions

Conditions such as systemic lupus erythematosus (SLE), rheumatoid arthritis, or multiple sclerosis (MS) may benefit from immunoglobulin therapy to modulate immune system activity, reduce inflammation, and prevent tissue damage.

05

SUMMARY

SUMMARY

- **Immunoglobulins** (Ig), or antibodies, are proteins produced by B cells that recognize and neutralize foreign substances like pathogens.
- **Classes:**
  (IgA, IgD, IgE, IgG, IgM)
- **Structure:** Immunoglobulins have a Y-shape with heavy and light chains, with variable regions for antigen binding.
- **Function:** They neutralize pathogens, activate complement, and enhance phagocytosis.
- **Clinical Importance:** Used in diagnostic tests, immunotherapy.

06

REFRENCE

REFRENCE

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