



IMMUNOGLOBULINS

57.1 INTRODUCTION

When foreign body (or) antigens, water, it activates or produces substances called antibodies into serum and body fluids and these antibodies reacts with antigens. The sera with high antibody levels following infection or immunization are called immune sera.

The term immunoglobulin means proteins of animal origin endowed with known antibody activity and for other proteins related to them by chemical structure.



OBJECTIVES

After reading this lesson, you will be able to:

- describe the structure of immunoglobulin
- classify immunoglobulins
- describe the characteristics of different immunoglobulins

57.2 STRUCTURE

Immunoglobulins are glycoproteins each consisting of two pairs of polypeptide chains of various sizes. The smaller chains are called light (L) chains and the larger ones 'heavy (H) chains. The chain is attracted to H chain by disulphide bond. H chain has molecular weight of approximately 25,000 and H chain of 50,000.

H chains are structurally and antigenically distinct for each class and are designated by Greece letter corresponding to immunoglobulin as

Immunoglobulin class	H chain
IgG	γ (gamma)
IgA	α (Alpha)
IgM	μ (mu)
IgD	δ (delta)
IgE	ϵ (epsilon)



Notes

The H chains are similar in all classes of Immunoglobulins. They are of two types kappa (κ) and lambda (λ). The antigen combining site of the molecule is at its aminoterminals which contains both L & H chains. The amino acid sequence of carboxy terminal half occur only in a constant sequence and it is therefore called as constant region whereas the amino acid sequence in the amino terminal half of the chain is highly variable and it is therefore called variable region. The range of antibody specificity of Immunoglobulins depends on the variability of the amino acid sequences at the variable region of H & L chain which terms the antigen combining sites.



INTEXT QUESTIONS 57.1

1. Immunoglobulins are proteins
2. Smaller polypeptide chain is calledchain & larger is calledchain
3. Carboxy terminal of immunoglobulin is called..... region and amino terminal is called region
4. The sera with high antibody activity following infection or immunization is called as sera

57.3 IMMUNOGLOBULIN CLASSES

Human sera contains IgG, IgA, IgM, IgD, & IgE in the descending order of concentration.

IgG: This is the major serum Immunoglobulin constitution of about 80% of the total and is equally distributed between intracellular and extracellular compartments. It contains less carbohydrate than other Immunoglobulins. It has half life of about 23 days.

IgG is the only material Immunoglobulin that is transported across placenta and provides passive immunity in new bonds. IgG binds to micro organisms and enhances their phagocytosis. IgG protects against infectious agents which are active in blood and tissues. Passively administered IgG suppresses homologous antibody synthesis by a Icedback process. This property is used in isoimmunization



Notes

of women by administration of anti Rh (D) IgG during delivery. Four subclasses have been identified namely IgG, IgG2, IgG3, IgG4,

IgA: The second most abundant class, constituting of about 10 – 13 % of serum Immunoglobulins and its half life is 6 – 8 days. It is the major Immunoglobulin in colostrums, saliva and tears.

The variety IgG plays an important role in local immunity against and intestinal pathogens and they are resistant to digestive enzymes and reducing agents. IgA antibody inhibits the adherence of micro organisms to the surface of mucosal cells by covering the organisms. It promotes phagocytosis and intracellular killing of micro organisms.

IgM: IgM constitutes of 5 – 8 % of serum Immunoglobulins with a half life of about five days. IgM is synthesized by fetus from 20 weeks of age. IgM is not transported across the placenta, the presence of IgM in the fetus or newborn indicates intrauterine infection and its detection is useful in diagnosis of congenital infections such as syphilis, rubella, HIV infection and toxoplasmosis. IgM is found in intravascular space and is responsible for protection against blood invasion by micro organisms. IgM deficiency is often associated with septicemias.

IgD: This resembles IgG structurally. It is intravascular and has half life of about three days. IgD and IgM occur on the surface of unstimulated B lymphocytes and serve as recognition receptors for antigens.

IgE: This resembles IgG structurally with half life of about two days. It is mostly extravascular and does not pass placental barriers. Serum levels get elevated during asthma and eczema.

IgE is produced in the linings of respiratory and intestinal tracts. IgE deficiency is associated with IgA deficiency in individual with impaired immunity. IgE is responsible for anaphylactic type of hypersensitivity.



INTEXT QUESTIONS 57.2

Match the following

- | | |
|--------|--|
| 1. IgG | (a) present in respiratory & Intestinal tracts |
| 2. IgA | (b) serves as recognition receptors for antigens |
| 3. IgM | (c) provides passive immunity in Newborns |
| 4. IgD | (d) present in colostrum |
| 5. IgE | (e) synthesized by fetus |



WHAT YOU HAVE LEARNT

- A substance that induces an immune response is called antigen.
- The sera with high antibody levels following infection or immunization are called immune sera.
- Immunoglobulins are glycoproteins
- Human sera contains IgG, IgA, IgM, IgD, & IgE in the descending order of concentration.
- IgG is major Immunoglobulin that is transported across placenta and provides passive immunity
- **IgA**, the second most abundant class, present in colostrum, saliva and tears.
- IgM is synthesized by fetus and is not transported across the placenta, and is useful in detection of congenital infections
- IgM occur on surface of B lymphocytes and serves as antigen receptors.
- IgE are present in linings of respiratory & Intestinal tracts



Notes



TERMINAL QUESTIONS

1. Describe the structure of immunoglobulins
2. Classify immunoglobulins



ANSWERS TO INTEXT QUESTIONS

57.1

1. Glycol
2. Light & heavy
3. Constant & Variable
4. Immune

57.2

1. (c)
2. (d)
3. (e)
4. (b)
5. (a)