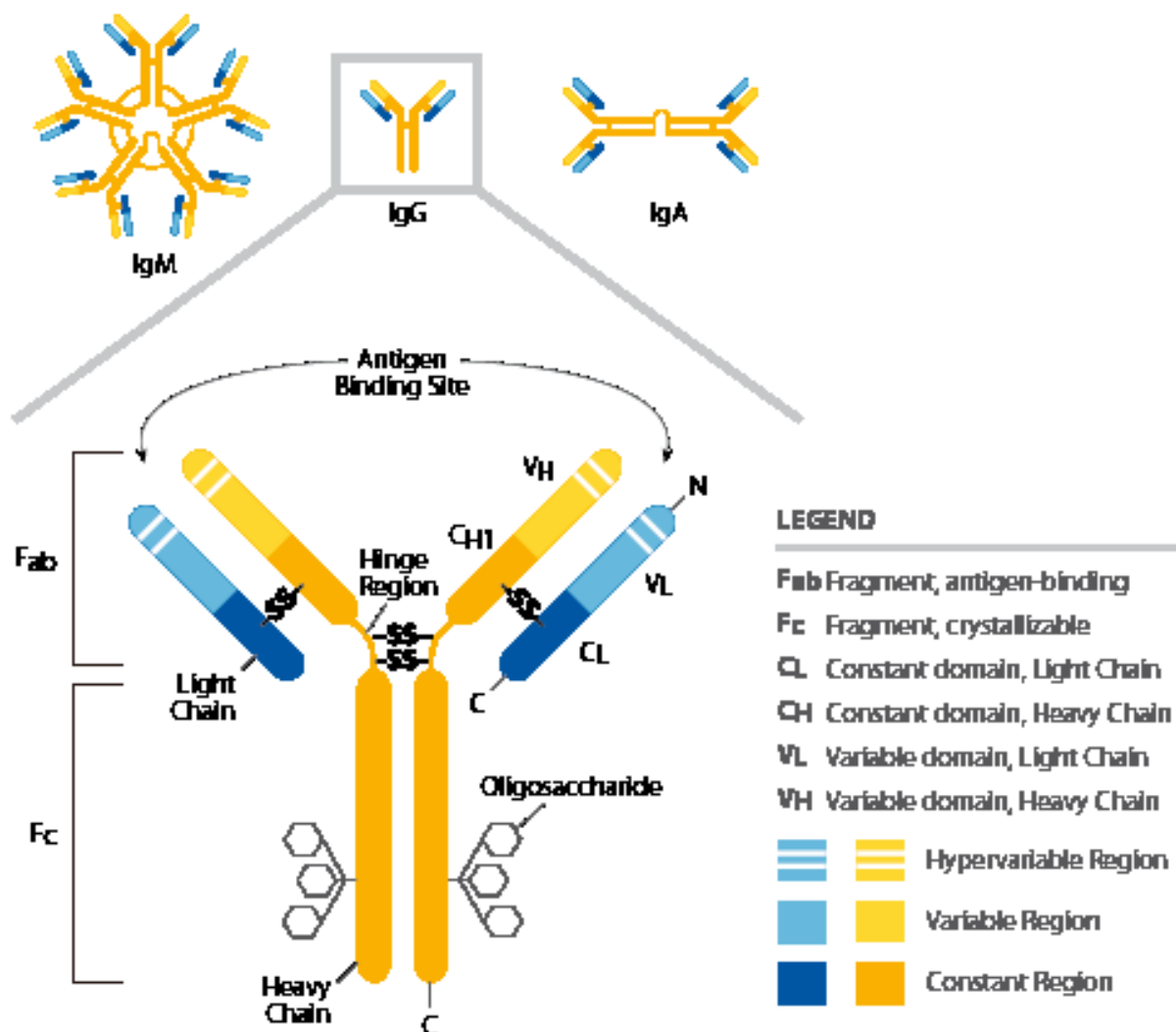


Antibody classes and Biological Activities:-

IgG > IgA > IgM > IgD > IgE



Immunoglobulin G (IgG)

1) Most abundant class in serum, constitutes about 80% of the total serum immunoglobulins

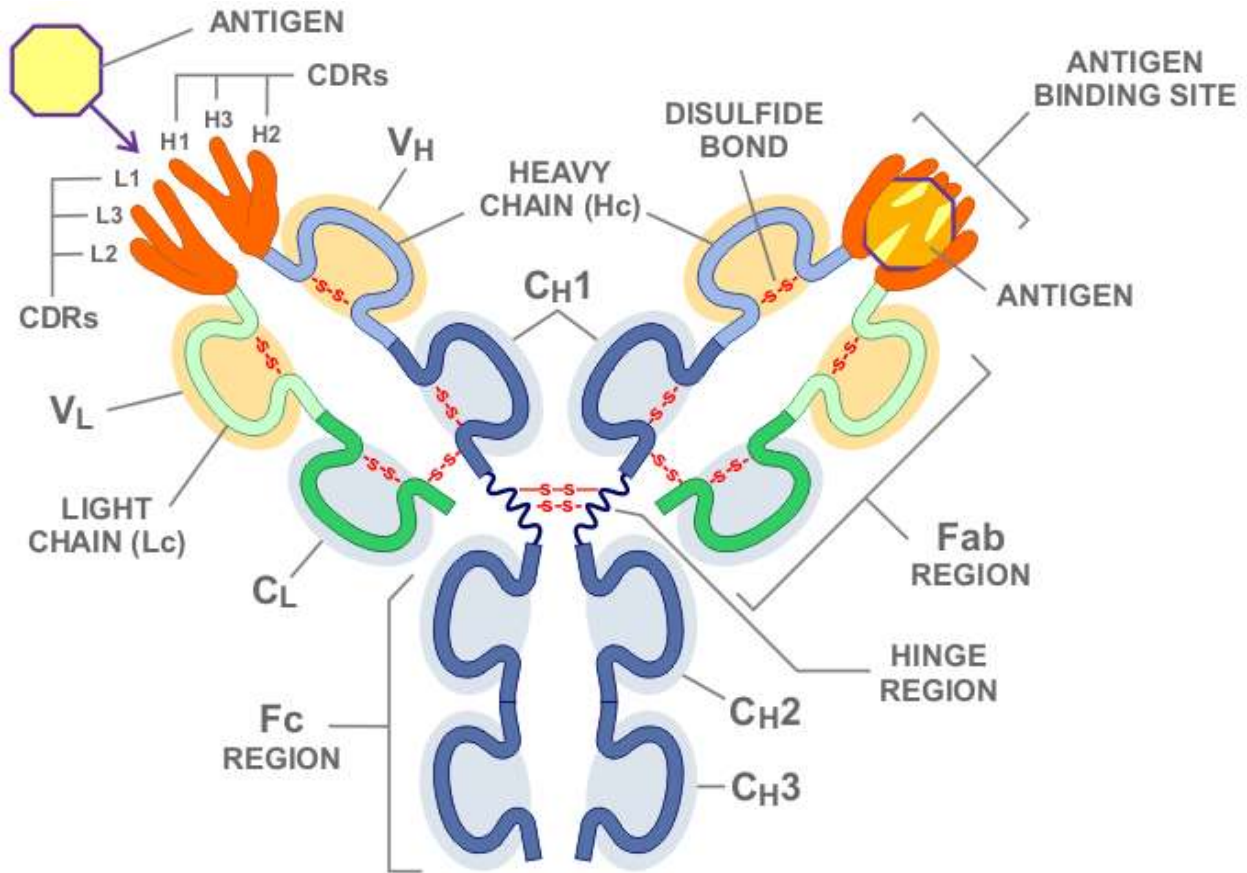
2) IgG1	In order of	2 disulfide bonds
IgG2	decreasing	4 disulfide bonds
IgG3	serum	11 disulfide bonds
IgG4	concentrations	2 disulfide bonds

3) The subtle amino acid difference between subclasses of IgG affect the biological activity of the molecules

1) **IgG 1, IgG 3, IgG 4** can readily cross the **Placenta** and play an important role in protecting the developing foetus.

2) **IgG 3, is** the most effective complement activator, followed by **IgG 1, IgG2** is less efficient, and IgG4 is not able to activate complement at all.

2) IgG1 and IgG3 bind with high affinity to Fe receptors on phagocytic cells and thus mediate opsonization,



IgM 1) 5-10% of total serum immunoglobulins

2) Average serum conc- 1.5 mg/ml

3) Pentamer(monomer units are held together by disulfide bonds)

3) Each pentamer contains an additional Fc- linked polypeptide called the (joining) chain, which is disulfide-bonded to the carboxyl-terminal cysteine residue of two of the ten chains. The J chain appears to be required for polymerization of the monomers to form pentameric IgM, it is just added before secretion of pentamer.

4) IgM is the **First immunoglobulin** class produced is a primary response to an antigen, and it is also the first immuno globulin to be synthesised by the NEONATE.

6) Because of its high valency, pentameric IgM is more efficient than other isotypes in binding antigen with many repeating epitopes such as viral particles and Red blood cells.

7) **IgM is more efficient than IgG at activating** complement. Complement activation requires two Fe regions in close proximity, and the pentameric structure of single molecule of IgM fulfils this requirement.

8) Because of its large size, IgM does not diffuse well and therefore is found in very low concentrations in the intercellular tissue fluids.

IgA- 1) 10% -15% of total immunoglobulin in serum

2) It is the predominant immunoglobulin class in external secretions such as breast milk, saliva, tears and mucus of the bronchial, genitourinary and digestive tracts.

3) In serum IgA exists primarily as a monomer, but polymeric forms (dimers, trimers, and some tetramers) are sometimes seen, all containing a j-chain polypeptide

4) The IgA of external secretions, called secretory IgA, consists of a dimer or tetramer, a j chain polypeptide and a polypeptide chain called secretory component.

5) Secretory component is derived from the receptor that is responsible for transporting polymeric IgA across cell membranes

6) The daily production of secretory IgA is greater than that of any other immunoglobulin class.

7) Secretory IgA has been shown to provide an important line of defense against bacteria such as *Salmonella*, *Vibrio cholerae*, and *Neisseria gonorrhoeae* and viruses such as polio, influenza and reovirus.

9) Breast milk contains secretory IgA and many other molecules that help protect the newborn against infection during the first month of life.

IgE

1) The potent biological activity of IgE allowed it to be identified in serum despite its extremely low average serum concentration (0.3 ug/ml)

2) IgE antibodies mediate the immediate hyper sensitivity reactions that are responsible for the symptoms of hay fever, asthma, hives and anaphylactic shock.

- 3) The presence of serum component responsible for allergic reactions was first demonstrated in 1921 by **K. Prausnitz and H. Kustner**, who injected serum from an allergic person intradermally into nonallergic individual. When the appropriate antigen was later injected at the same site, a wheal and flare reaction (analogous to hives) developed there. The reaction called the **P-K reaction** was the basis for the first biological assay for IgE activity.
- 4) Actual identification of IgF was accomplished by **K. and T. Ishizaka** in 1966.
- 5) IgE binds to Fc receptors on the membranes of blood basophils and tissue mast cells. Cross linkage of receptor bound IgE molecules by antigen (allergen) induces basophils and mast cells to translocate their granules to the plasma membrane and release their contents to the extracellular matrix, a process known as degranulation.

IgD (No Biological effector function)

- 1) IgD was discovered when a patient developed a multiple myeloma whose myeloma protein failed to react with antisotype antisera against the then known isotype: IgA, IgM and IgG.
- 2) When rabbits were immunized with this myeloma protein, the resulting antisera were used to identify the same class of antibody at low levels in normal human serum.
- 3) The new class, called IgD, has a serum conc. of 30 ug/ml and constitutes about 0.2% of total immunoglobulin in serum.