



Difference Between IGA and IGG

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Key Difference - IGA vs IGG

Immunoglobulins are termed as a special type of globular proteins with a complex structure. They are produced by the living system as a secondary specific immune response upon contacting with an antigen of a foreign particle or an organism. Immunoglobulins are also known as antibodies which are specific proteins produced in response to an antigen. The main five classes of antibodies are – Immunoglobulin (Ig) A, G, M, E, D. Immunoglobulin A (IgA/IGG) is a secretory immunoglobulin present in the mucosal surfaces, consisting of a J chain and a secretory polypeptide which participates in the secretory function. Immunoglobulin G (IgG/IGG) is primarily involved in acting against foreign pathogens which include bacteria and virus. The **key difference** between IGA and IGG is the presence and absence of the secretory polypeptide. **IGA has a secretory polypeptide to facilitate secretion via mucosal surfaces whereas IGG does not have a secretory function thus, the J chain is absent.**

What is IGA?

IGA is a type of immunoglobulin which possesses a secretory function. Hence IGA can be mainly found in secretions including saliva and breast milk. About 50% of the protein composition of colostrum is IGA. It is also secreted by the mucosal layers of the gastrointestinal tract and respiratory tract. This provides a protective mechanism against the pathogens entering to the gut or to the respiratory tract.

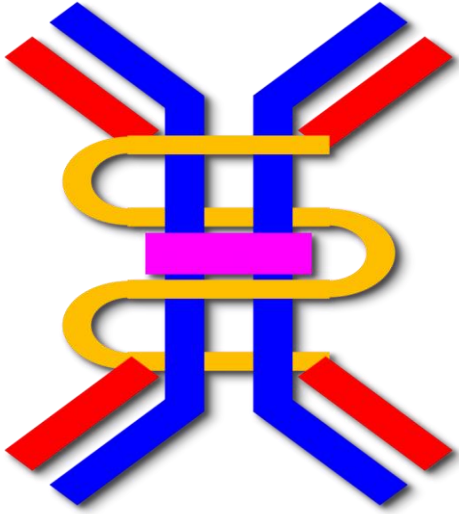


Figure 01: Structure of IGA

There are two main sub classes of IGA; IGA 1 and IGA2. IGA1 possess a longer hinge region and has an extra duplicated set of [amino acids](#) in its structure. This elongated hinge region increases the sensitivity of IGA1 to bacterial [proteases](#). Therefore, it is present mostly in the serum. IGA2 is composed of a shorter hinge region, and it lacks the amino acid duplicate structure. Therefore, it does not have an increased sensitivity to protease. IGA2 is present mostly in the mucous secreting membranes.

IGA forms a dimer structure which is a characteristic of this type of immunoglobulin. The monomers are joined by a structure known as the J chain. The J chain is linked to the dimer structure via disulfide linkages. A polypeptide is associated with the dimer structure which acts as the secretory polypeptide component of IGA. The main function of IGAs is to protect the mucosal layers from external toxins and chemicals such as bacterial and viral toxins. IGA participates in a neutralizing reaction to neutralize the [toxin](#) products.

What is IGG?

IGG is the most common type of immunoglobulin present in the system. It is also the main form of circulatory immunoglobulin in the body. IGG is the only form of immunoglobulin that can cross the placenta and reach the fetus. IGG consists of four polypeptide chains; 2 heavy chains and 2 light chains that are linked together by inter chain disulfide linkages. Each heavy chain consists of a N-terminal variable domain (VH) and three constant domains (CH1, CH2, CH3), with an additional “hinge region” between CH1 and CH2. Each light chains consist of a N-terminal variable domain (VL) and a constant domain (CL). The light chain is associated with the VH and CH1 domains to form a Fab arm

(“Fab” = fragment antigen binding), and the V regions interact to form the antigen-binding region. Further IGG also contains a highly conserved region which consists of a glycosylated amino acid at the 297th position.

Anatomy of an IgG

(residue numberings are approximate)

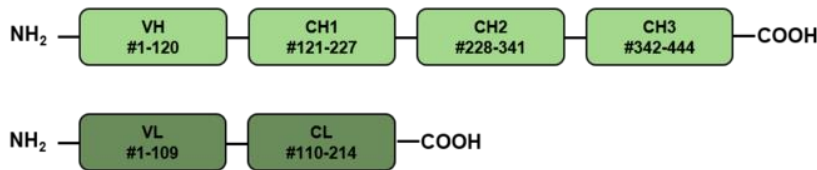
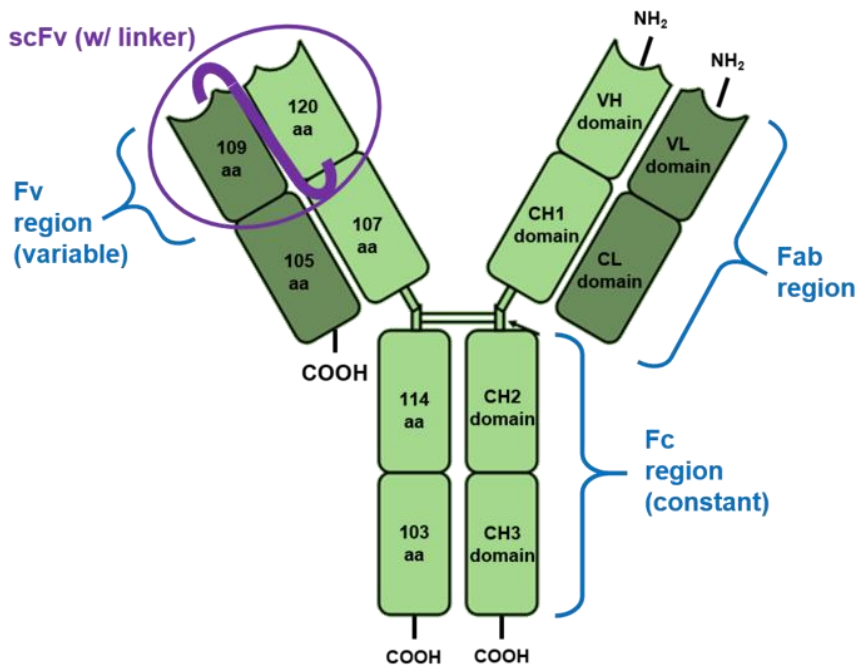


Figure 02: General structure of IGG

IGG has four major sub classes namely IgG1, IGG2, IGG3, and IGG4. IGG1 is the most abundant subclass. It is the immediate antibody response produced in the body upon an [infection](#) by a bacterial or a viral agent. IGG2 are produced mainly in response to bacterial capsular antigens. These antibodies respond to carbohydrate-based antigens. It can also act against viruses which possess carbohydrate based antigens. IGG3 is a pro-inflammatory antibody which is generally produced in response to a viral infection. IGG3 is the main antibody produced in response to blood group antigens. IGG4 antibodies are produced in response to prolonged infections.

What are the Similarities Between IGA and IGG?

- Both are produced due to a secondary immune response.
- Both are produced in response to antigens or antigenic markers produced in
- Both are highly specific.
- Both consists of four polypeptide chains; 2 heavy chains and 2 light chains.
- Both participate in fighting against bacterial and viral pathogens.

What is the Difference Between IGA and IGG?

| IGA vs IGG | |
|---|--|
| IGA is an antibody present in secretions and mucous membranes and acts against bacterial and viral pathogens. | IGG is an antibody produced as a secondary immune mechanism involved in fighting against pathogenic viral and bacterial strains. |
| Distribution | |
| IGA is in mucous membranes and body secretions such as saliva and breast milk. | IGG is in all intra and extra vascular tissues. |
| Composition of the heavy chain | |
| IGA has Alpha heavy chain. | IGG has Gamma heavy chain. |
| Concentration in Serum | |
| In serum, IGA concentration is 0.6 – 3 mg/ml. | In Serum, IGG concentration is 6 – 13 mg/ml. |
| J Chain | |
| Present in IGA. | Absent in IGG. |
| Secretory Polypeptide | |
| Present in IGA. | Absent in IGG. |
| Ability to cross the placenta | |
| IGA cannot cross the placenta. | IGG can cross the placenta. |

Summary - IGA vs IGG

Both IGA and IGG are produced in the body as a [secondary immune response](#). They are specific antibodies which act by binding to a specific antigen. The major difference of the two immunoglobulins is based on the function of secretion. IGA is present in secretory fluids and in mucous secreting membranes whereas, IGG is the most abundant immunoglobulin in the serum. Both have the ability to fight against microbial pathogens. This is the difference between IGA and IGG.

Reference:

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