

جامعة الانبار  
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اسم المادة: المناعة  
عنوان المحاضرة:

**STRUCTURE AND SOME PROPERTIES  
OF IG CLASSES AND SUBCLASSES**

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## STRUCTURE AND SOME PROPERTIES OF IG CLASSES AND SUBCLASSES

### IgG

#### Structure.

All IgG's are monomers (7S immunoglobulin). The subclasses differ in the number of disulfide bonds and length of the hinge region.

#### Properties

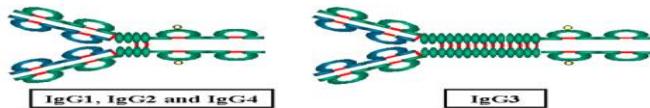
IgG is the most versatile immunoglobulin because it is capable of carrying out all of the functions of immunoglobulin molecules.

- a) IgG is the major Ig in serum – (75% of serum Ig is IgG )
- b) IgG is the major Ig in extra vascular spaces
- c) Placental transfer -- IgG is the only class of Ig that crosses the placenta. Transfer is mediated by a receptor on placental cells for the Fc region of IgG. Not all subclasses cross equally well;- IgG2 does not cross well.
- d) Fixes complement - Not all subclasses fix equally well;- IgG4 does not fix complement
- e) Binding to cells - Macrophages, monocytes, PMNs and some lymphocytes have Fc receptors for the Fc region of IgG. Not all subclasses bind equally well; IgG2 and IgG4 do not bind to Fc receptors. A consequence of binding to the Fc receptors on PMNs, monocytes and macrophages is that the cell can now internalize the antigen better. The antibody has prepared the antigen for eating by the phagocytic cells. The term **opsonin**

used to describe substances that enhance phagocytosis. IgG is a good opsonin. Binding of IgG to Fc receptors on other types of cells results in the activation of other functions.

## IgG

- Structure
  - Monomer (7S)



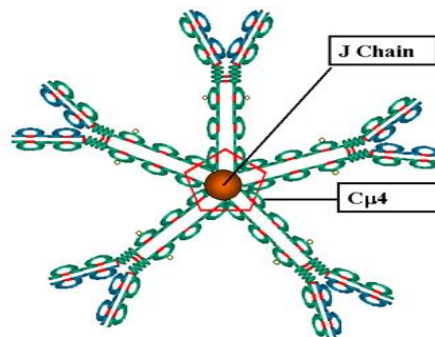
## IgM

### Structure

IgM normally exists as a pentamer (19S immunoglobulin) but it can also exist as a monomer. In the pentameric form all heavy chains are identical and all light chains are identical. It has another protein covalently bound via a S-S bond called the J chain. This chain functions in polymerization of the molecule into a pentamer.

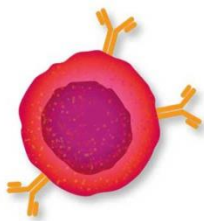
## IgM

- Structure
  - Pentamer (19S)
  - Extra domain ( $C_{H4}$ )
  - J chain



### Properties

- a) IgM is the third most common serum Ig.
- b) IgM is the first Ig to be made by the fetus and the first Ig to be made by a virgin B cells when it is stimulated by antigen.
- c) As a consequence of its pentameric structure, IgM is a good complement fixing Ig. Thus, IgM antibodies are very efficient in leading to the lysis of microorganisms.
- d) As a consequence of its structure, IgM is also a good agglutinating Ig . Thus, IgM antibodies are very good in clumping microorganisms for eventual elimination from the body.
- e) IgM binds to some cells via Fc receptors.
- f) B cell surface Ig



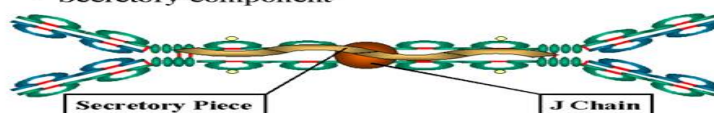
## IgA

### Structure

Serum IgA is a monomer but IgA found in secretions is a dimer as presented in Figure below. When IgA exists as a dimer, a J chain is associated with it.

### IgA

- Structure
  - Serum - monomer
  - Secretions (sIgA)
    - Dimer (11S)
    - J chain
    - Secretory component



When IgA is found in secretions is also has another protein associated with it called the **secretory piece or T piece**. The secretory piece helps IgA to be transported across mucosa and also protects it from degradation in the secretions.

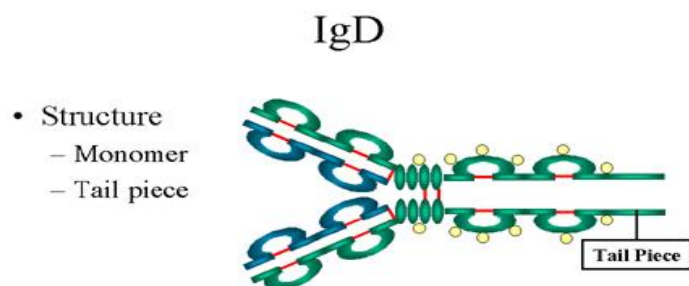
## Properties

- a) IgA is the 2nd most common serum Ig.
- b) IgA is the major class of Ig in secretions - tears, saliva, colostrum, mucus. Since it is found in secretions secretory IgA is important in local (mucosal) immunity.
- c) Normally IgA does not fix complement.
- d) IgA can binding to some cells - PMN's and some lymphocytes.

## IgD

### Structure

IgD exists only as a monomer.



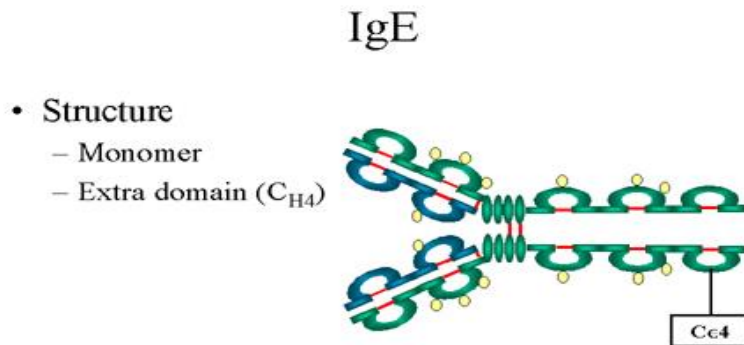
## Properties

- a) IgD is found in low levels in serum; its role in serum uncertain.
- b) IgD is primarily found on B cell surfaces where it functions as a receptor for antigen. IgD on the surface of B cells has extra amino acids at C-terminal end for anchoring to the membrane.
- c) IgD does not bind complement.

# IgE

## Structure

IgE exists as a monomer and has an extra domain in the constant region.



## Properties

a) IgE is the least common serum Ig since it binds very tightly to Fc receptors on basophils and mast cells even before interacting with antigen.

b) Involved in allergic reactions - As a consequence of its binding to basophils and mast cells, IgE is involved in allergic reactions. Binding of the allergen to the IgE on the cells results in the release of various pharmacological mediators that result in allergic symptoms.

c) IgE also plays a role in parasitic helminth diseases. Since serum IgE levels rise in parasitic diseases, measuring IgE levels is helpful in diagnosing parasitic infections. Eosinophils have Fc receptors for IgE and binding of eosinophils to IgE-coated helminths results in killing of the parasite.

d) IgE does not fix complement.

References:-

- 1- Richard Coioco and Geoffery Sunshine (2014). Immunology. Seventh edition. Wiley Blackwell.