

A study material for M.Sc. Biochemistry (Semester: III) Students
on the topic (CC-12; Unit II)

Antibody

Types and Functions II

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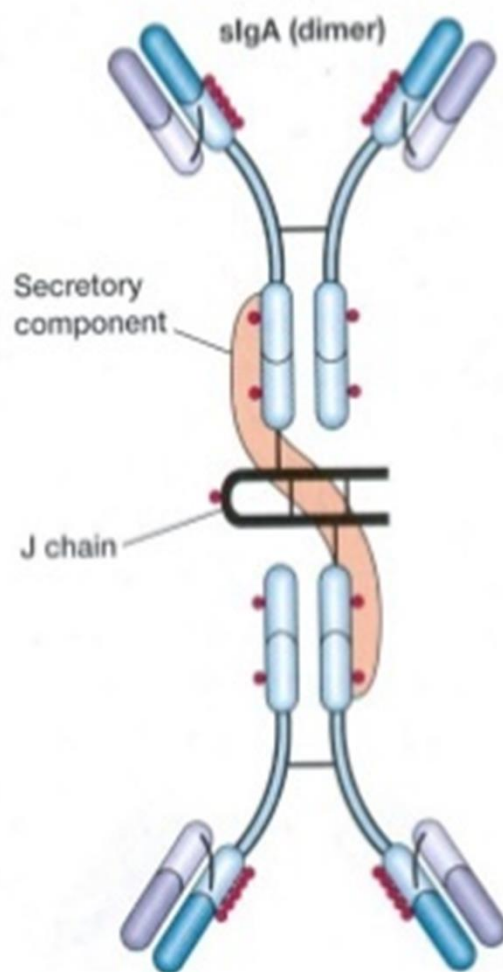
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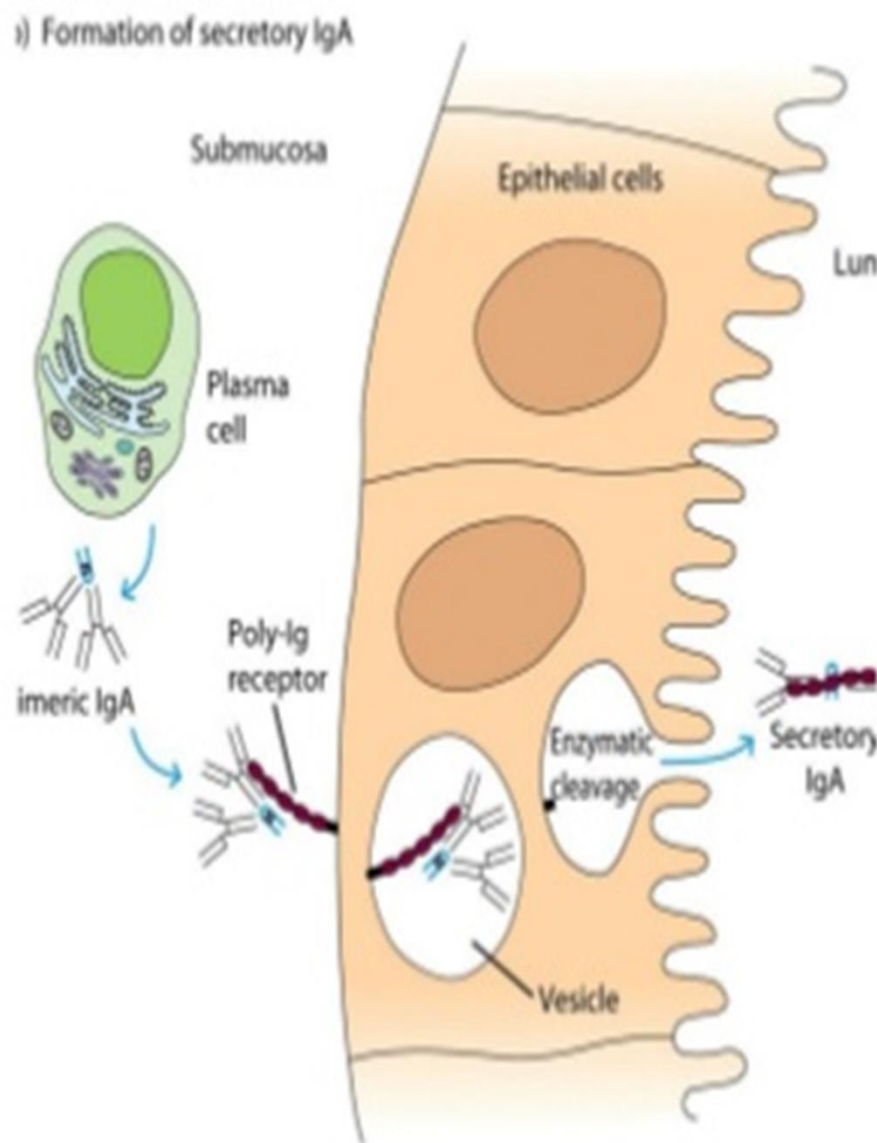
Immunoglobulin A (Ig A)

- Constitutes 10-15 % of total immunoglobulins
- Present in milk, saliva, tears, mucous of respiratory tract, digestive tract and genitourinary tract.
- In serum exist as monomer
- In external secretions exist as dimer called secretory Immunoglobulin.
- Has 'J' chain and secretory piece.
- Half life: 6-8 days



Secretory piece of Ig A

- Unlike the remainder of the IgA which is made in the plasma cell, the secretory piece is made in epithelial cells and is added to the IgA as it passes into the secretions
- The secretory piece helps IgA to be transported across mucosa and also protects it from degradation in the secretions.

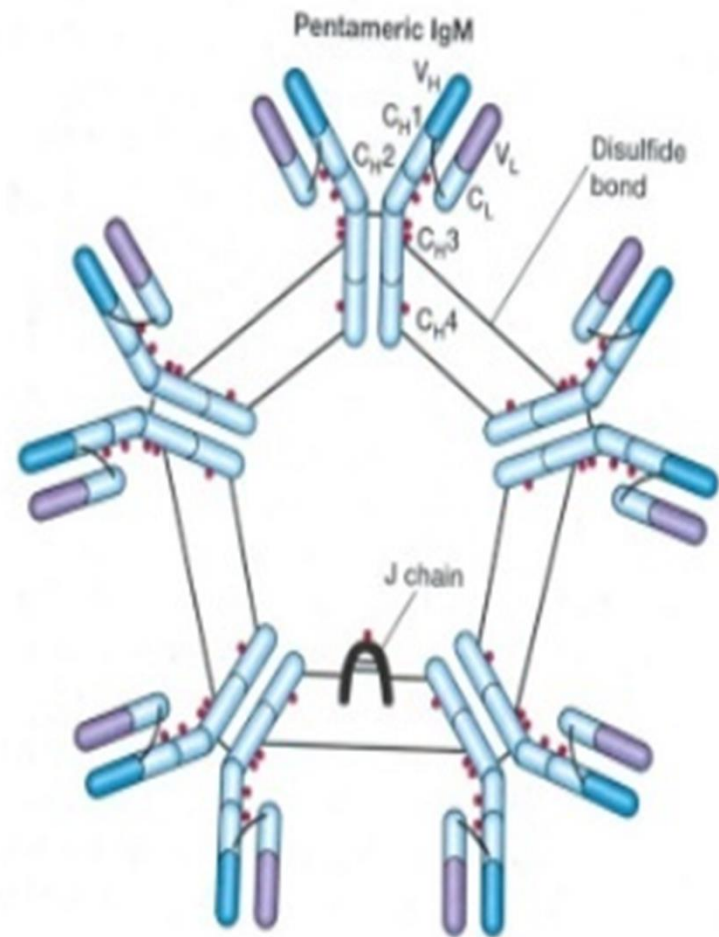


Functions:-

- Provides local immunity.
- Secretory Ig A binds to surface antigens of microorganism and prevent its attachment and invasion of the mucosal surfaces of respiratory and digestive tract- immune elimination.
- Secretory IgA provides important line of defense against *salmonella*, *Vibrio cholerae*, *N. gonorrhoeae*, influenza virus and poliovirus.
- Secretory IgA present in breast milk protects newborn during first months of life.
- Activates complement by the alternative pathway
- Promotes phagocytosis and intracellular killing of microorganisms

Immunoglobulin M (Ig M)

- Accounts for 5-10% of total serum proteins
- Polymer of five monomeric units (pentamer)
- Held together by disulfide bonds and 'J' chain
- Mol. Wt. of 900,000-10,00,000 (millionaire molecule)
- Half life: 5 days

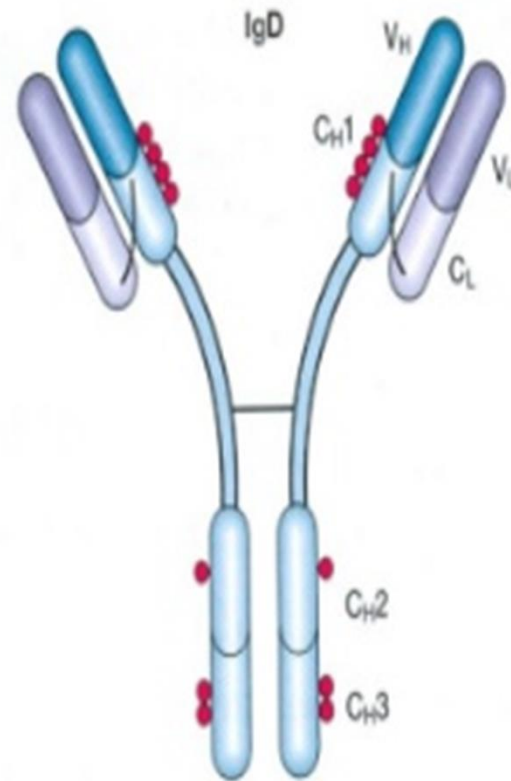


Biological Functions of IgM

- Good at virus neutralization
- Poor at toxin neutralization
- Excellent at bactericidal activity
- Excellent at causing agglutination of antigens
- Excellent at causing precipitation of antigens
- Excellent at complement fixation
- Does not bind to M ϕ Fc receptors
- As a monomer, it serves as surface receptor for antigens on B cells

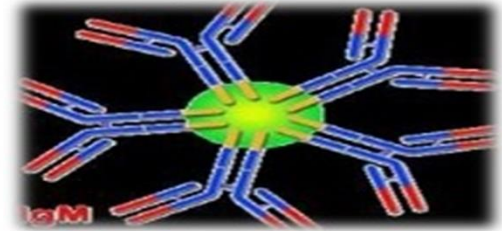
Immunoglobulin D (Ig D)

- Structure is similar to IgG
- Serum concentration 30 micrograms per ml
- Constitutes 0.2% of total immunoglobulins
- Half life: 3 days
- IgD together with IgM is major membrane bound immunoglobulin on unstimulated B lymphocytes-acts as recognition receptors for antigens



II. IgM

- ◆ **Structure: Pentamer**
- ◆ **Percentage serum antibodies: 5-10%**
- ◆ **Location: Blood, lymph, B cell surface (monomer)**
- ◆ **Half-life in serum: 5 days**
- ◆ **Complement Fixation: Yes**
- ◆ **Placental Transfer: No**
- ◆ **Known Functions: First antibodies produced during an infection. Effective against microbes and agglutinating antigens.**

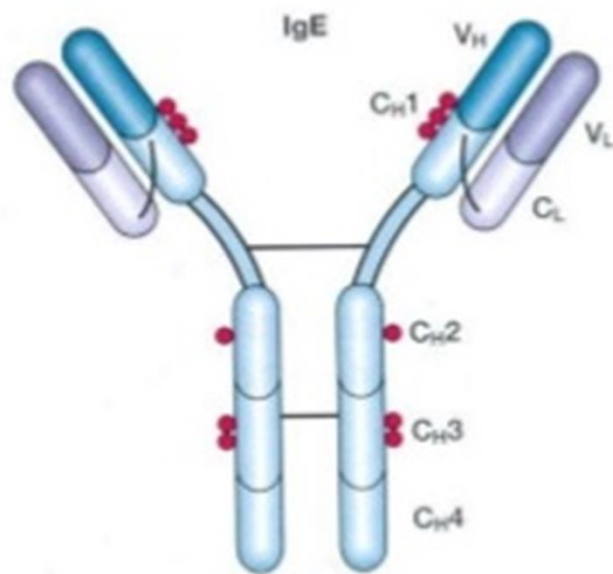


Functions

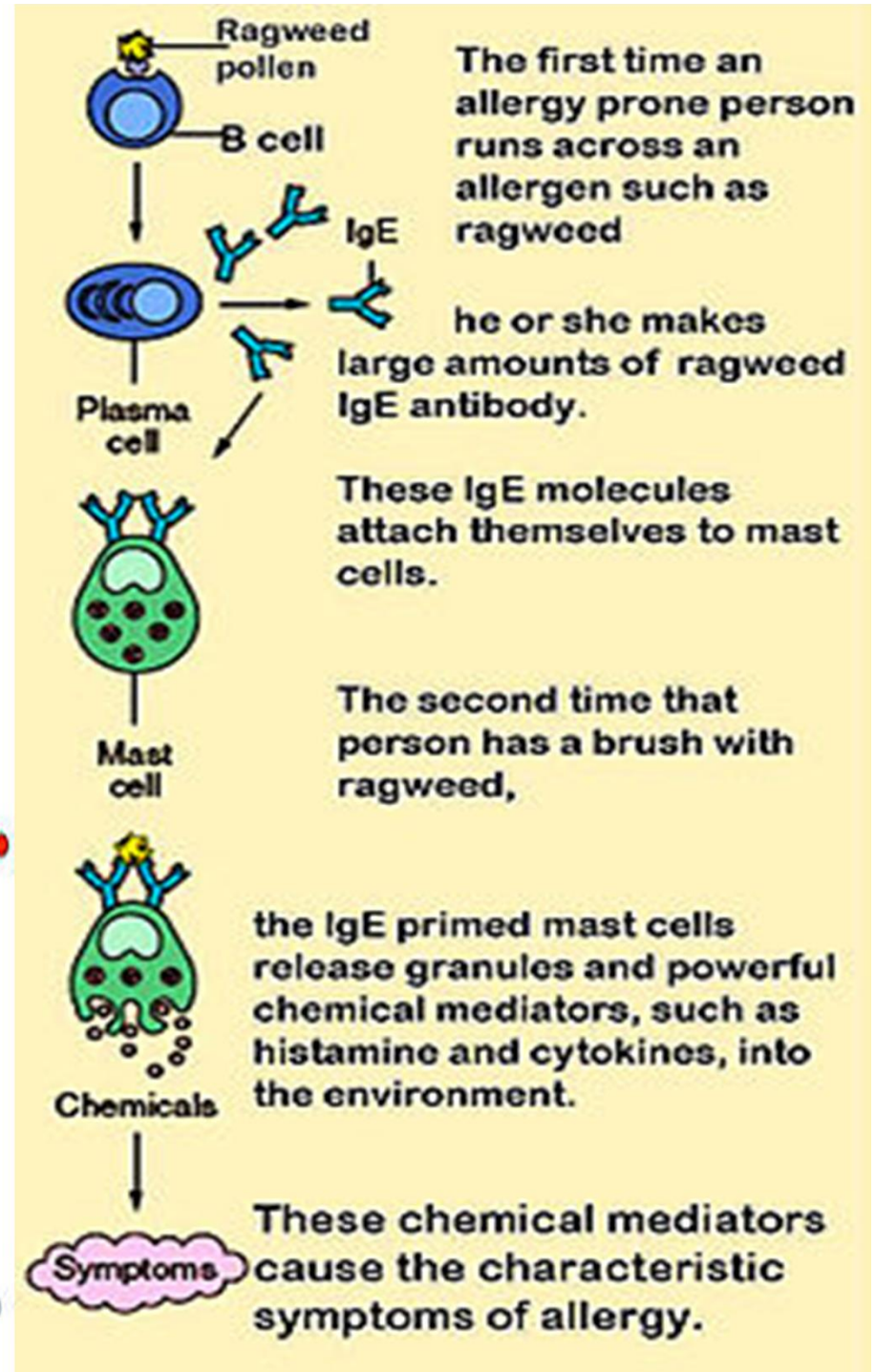
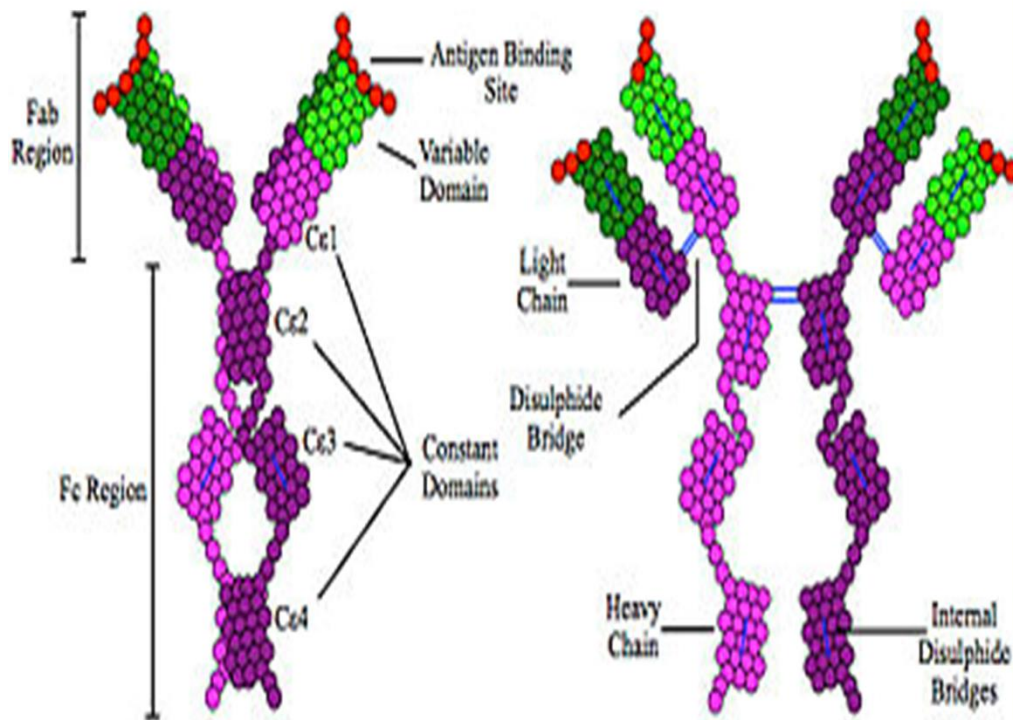
- It agglutinates bacteria
- Activates complement by classical pathway
- Causes opsonization and immune hemolysis
- Believed to be responsible for protection against blood invasion by microorganisms

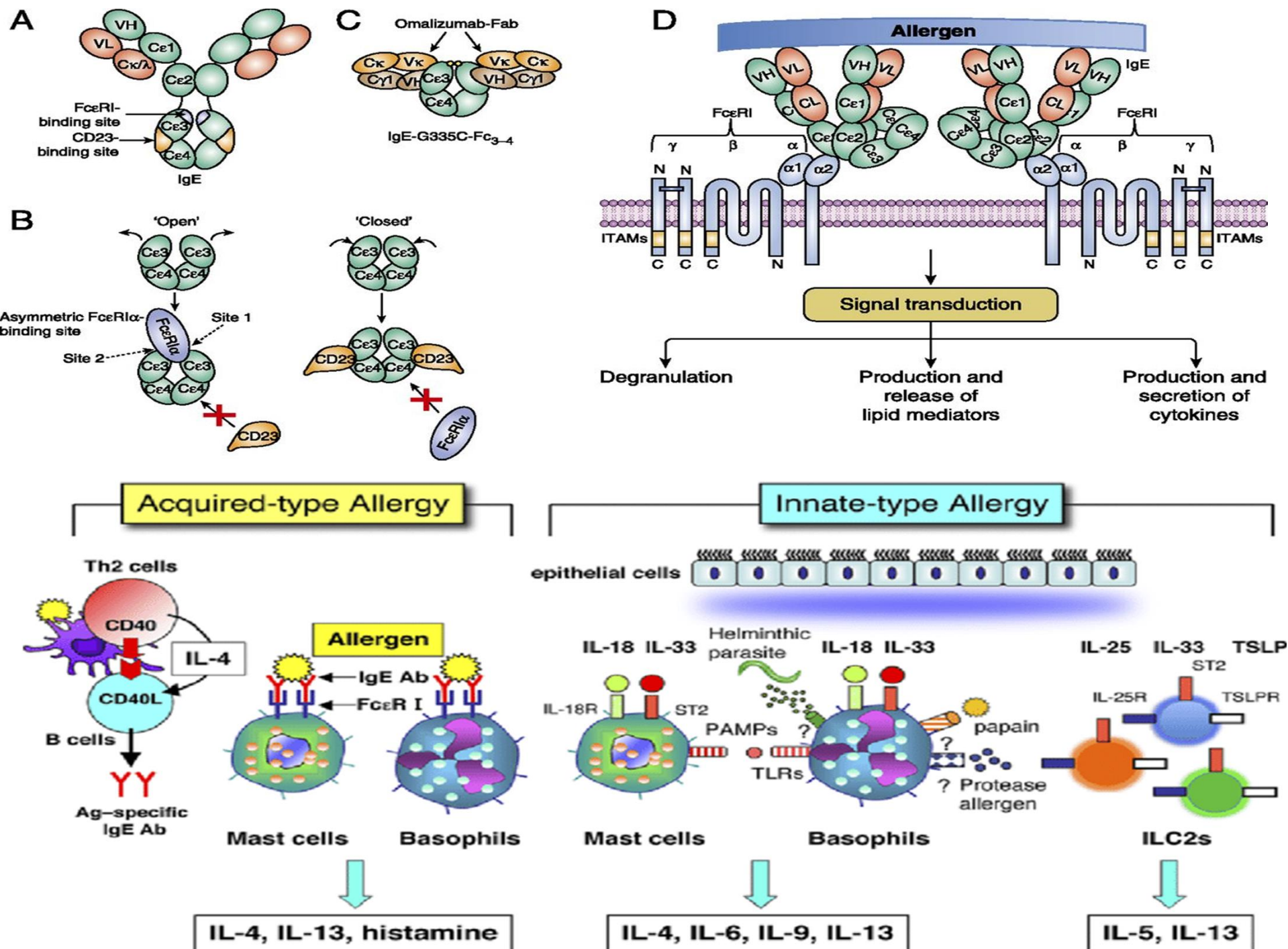
Immunoglobulin E (Ig E)

- Structure is similar to Ig G
- Has 4 constant region domains.
- Mol. Wt. 1,90,000
- Half life: 2 days
- Heat labile (inactivated at 56°C in 1 hour)
- Normal serum concentration 0.3 ug/ml
- Mostly present extra cellularly
- Does not cross placenta



The major role of Ig E is in allergic reactions





Acknowledgement and Suggested Readings:

1. Kuby Immunology; Sixth Edition; Kindt, Goldsby and Osborne; W. H. Freeman and Company
2. Fundamental Immunology; 5th edition; William E., Md. Paul (Editor) ; Lippincott Williams & Wilkins Publishers
3. Roitt's Essential Immunology; Tenth Edition; Roitt and Delves; Blackwell Science
4. Cellular and Molecular Immunology; 6th Edition; Abbas, Lichtman and Pillai; Saunders Elsevier

Thanks