

# Unit II

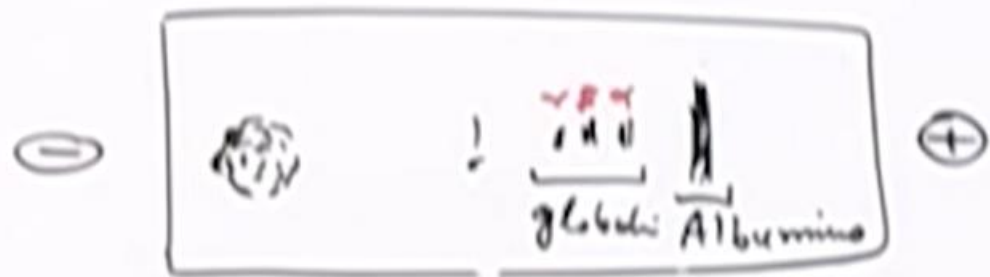
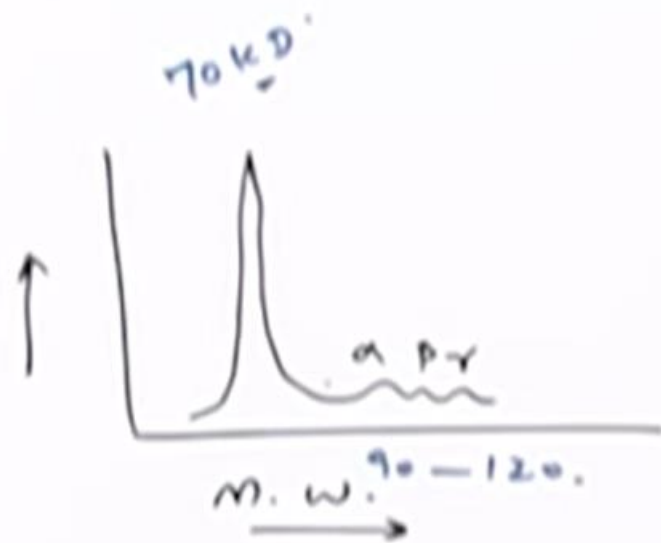
Immunoglobulin

Slides were made from YouTube

**Antibodies**

**Immunoglobulins**

They belong to a **group of glycoproteins known as globulins.**



Electrophoresis



The **basic structure** of all antibodies and the structure of BCRs **is same**.

**BCR**

Membrane bound immunoglobulin

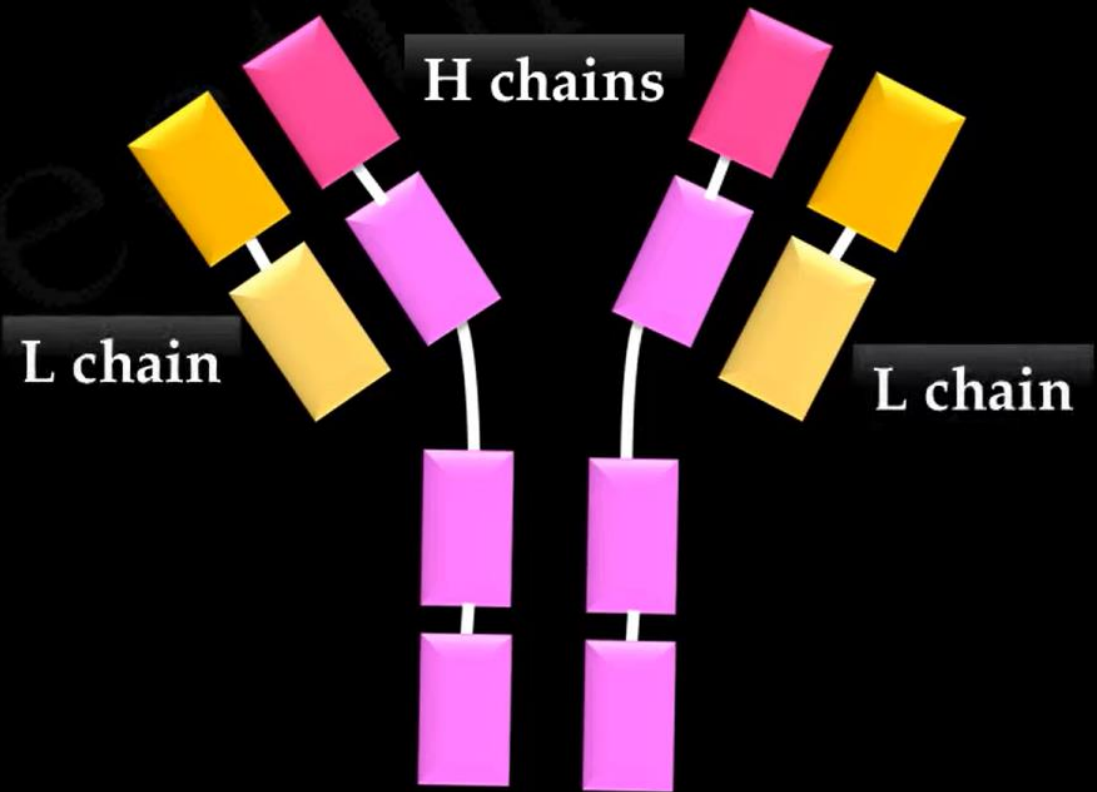
**Antibody**

Secreted Immunoglobulin

# Basic Antibody Structure

## Four polypeptide chains

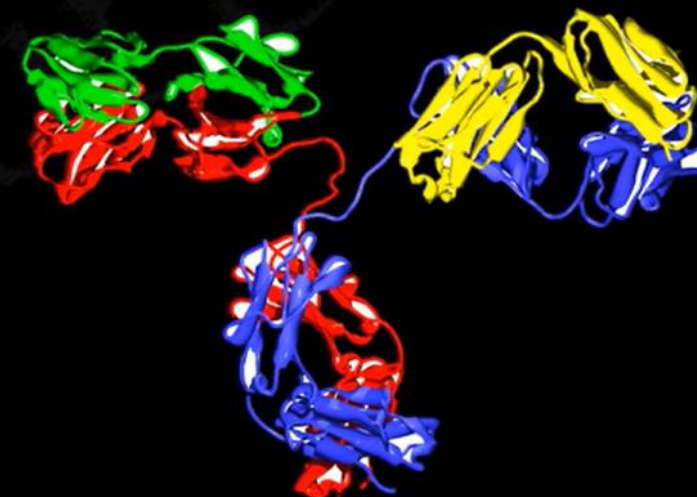
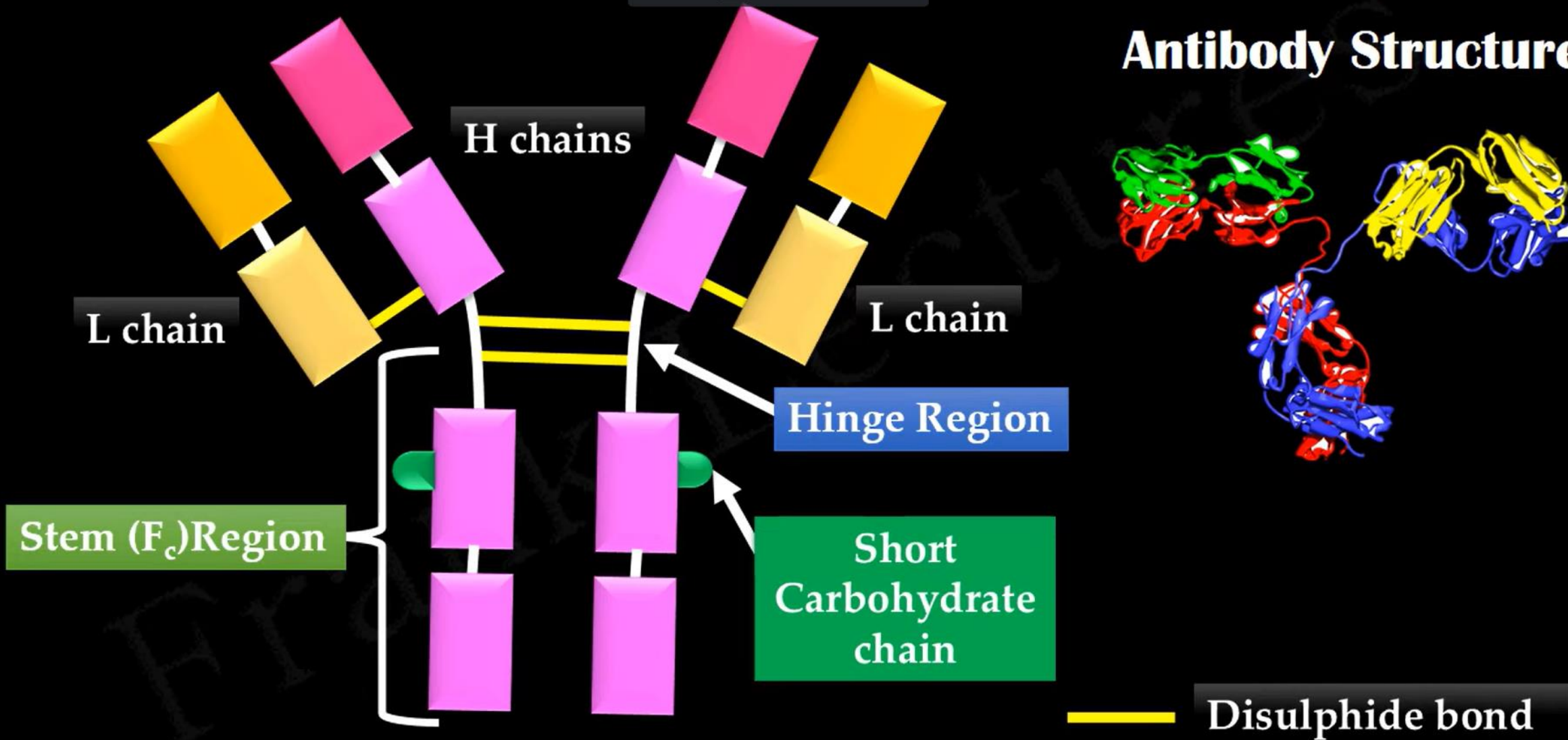
- Two identical heavy chains  
(H chains)
- Two identical light chains  
(L chains)



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# Basic

## Antibody Structure







## 2 Types of L-chains:

**Kappa** ( $\kappa$ )

**Lambda** ( $\lambda$ )

## 5 types of Heavy chains:

**Gamma**( $\gamma$ )

**Alpha** ( $\alpha$ )

**Mu** ( $\mu$ )

**Delta** ( $\delta$ )

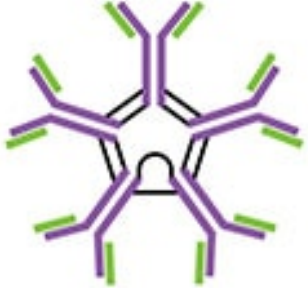
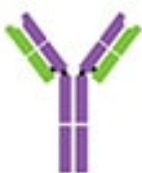
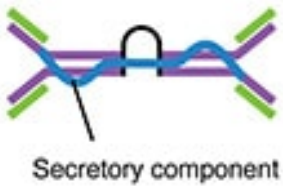
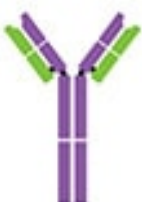

**epsilon**( $\epsilon$ )





<b>Class of Antibody</b>	<b>Serum levels</b>	<b>Structure</b>	<b>Biological functions</b>
IgM	5%	Monomer Pentamer	Membrane-bound immunoglobulin on the surface of immature and mature B cells First antibody produced in a primary response to an antigen First antibody produced by the fetus Efficient in binding antigens with many repeating epitopes, such as viruses Classical complement activation
IgD	0.3%	Monomer	Membrane-bound immunoglobulin on the surface of mature B cells No biological effector function known
IgA	7-15%	Monomer Dimer	Predominant antibody class in secretions (saliva, tears, breast milk) and mucosa First line of defence against infection by microorganisms
IgG	85%	Monomer	Most abundant class with four isotypes - IgG1, IgG2, IgG3, IgG4 Crosses the placenta Opsonization
IgE	0.02%	Monomer	Defence against parasite infections Associated with hypersensitivity reactions (allergies) Found mainly in tissues

The Five Immunoglobulin (Ig) Classes

	IgM pentamer	IgG monomer	Secretory IgA dimer	IgE monomer	IgD monomer
					
Heavy chains	$\mu$	$\gamma$	$\alpha$	$\epsilon$	$\delta$
Number of antigen binding sites	10	2	4	2	2
Molecular weight (Daltons)	900,000	150,000	385,000	200,000	180,000
Percentage of total antibody in serum	6%	80%	13%	0.002%	1%
Crosses placenta	no	yes	no	no	no
Fixes complement	yes	yes	no	no	no
Fc binds to		phagocytes		mast cells and basophils	
Function	Main antibody of primary responses, best at fixing complement; the monomer form of IgM serves as the B cell receptor	Main blood antibody of secondary responses, neutralizes toxins, opsonization	Secreted into mucus, tears, saliva, colostrum	Antibody of allergy and antiparasitic activity	B cell receptor