IMMUNOGLOBULINSES

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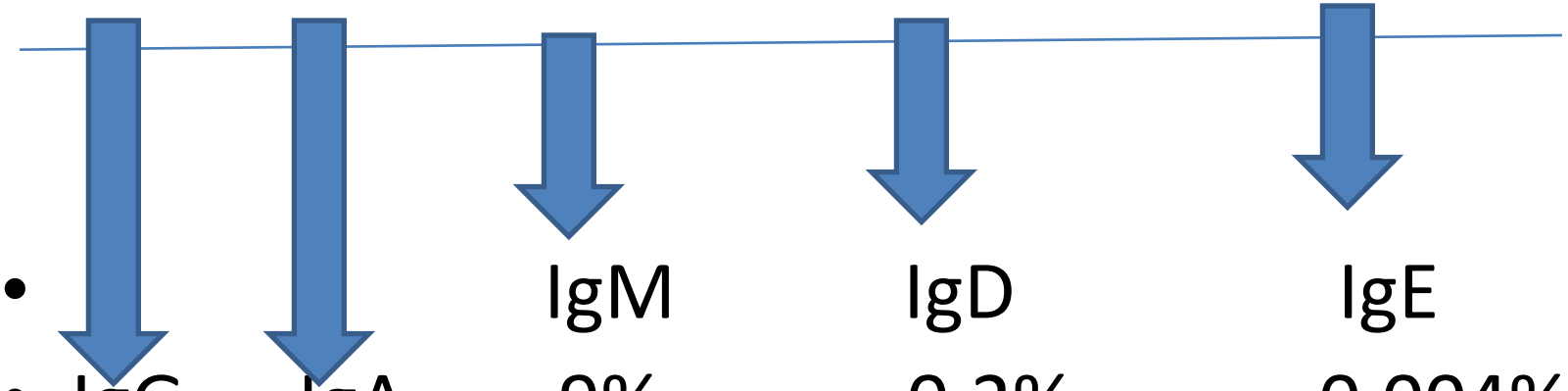
immunoglobulins

Antibodies are globulins proteins (immuonoglobulins)

- They react specifically with the ***ANTIGEN*** which stimulated their production.
- They make up about 20% of protiens in ***PLASMA.***
- Blood contains 3 types of globulins protiens based on electrophoretic migration rate (alpha,beta,gamma)

Cont

- There are 5 classes of ANTIBODIES



- IgM IgD IgE
- IgG IgA 9% 0.2% 0.004%
- 75% 15%
- The subdivision of these 5 classes depends on their ***HEAVY*** chains

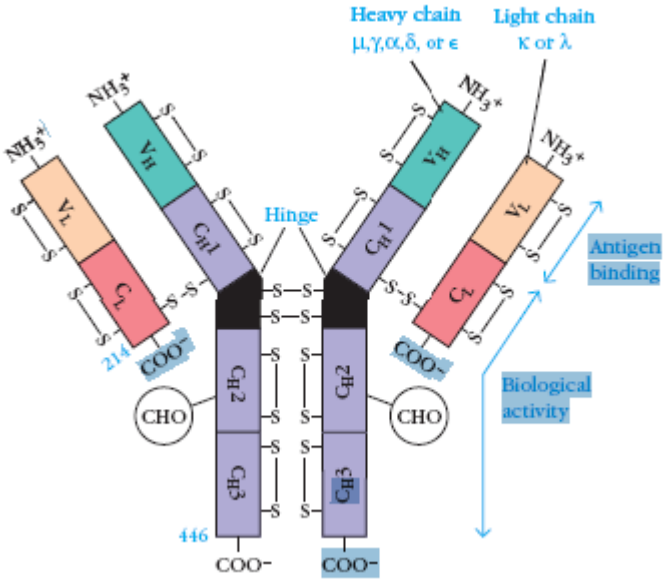
THE MOST IMPORTANT FUNCTION OF ***antibodies***

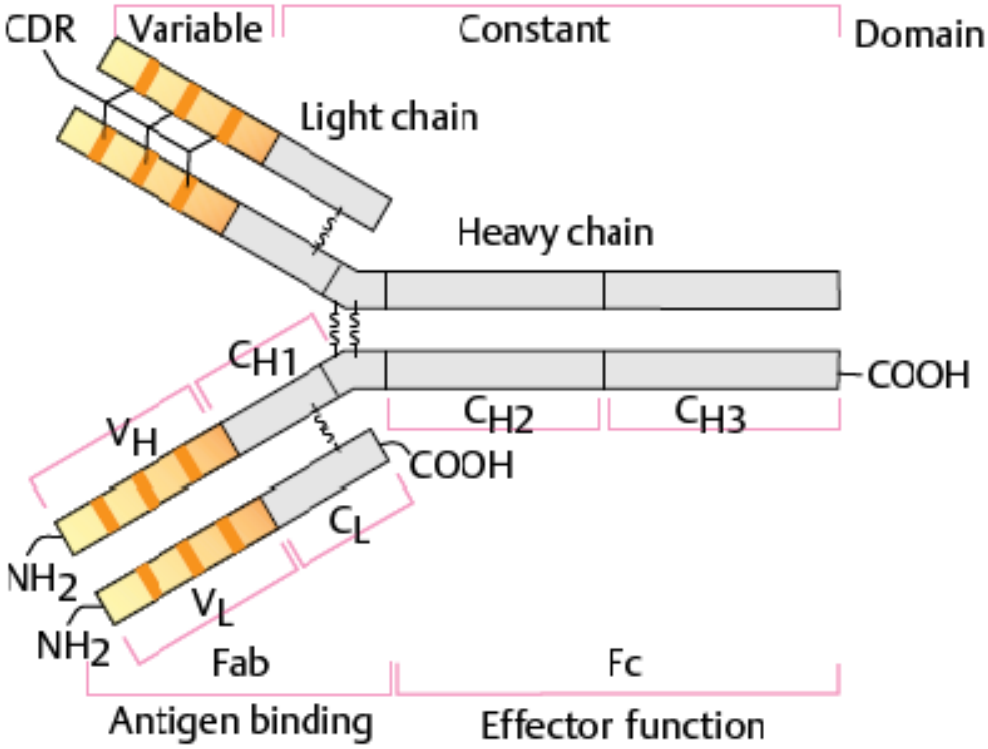
- NEUTRILIZE TOXINS AND VIRUSES
- OPSONIZE MICROBES
- ACTIVATE COMPLEMENT
- PREVENT THE ATTACHMENT OF MICROBES TO THE MUCOSAL SURFACE.
- CATALYTIC (enzymatic)CAPACITY. → OZONE as microbicidal activity(O_3)

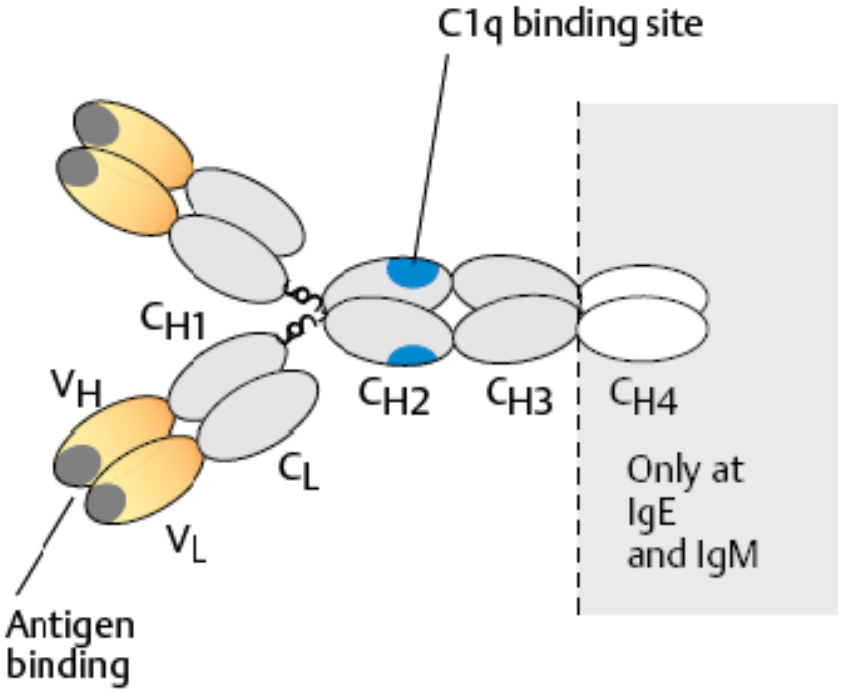
ANTIBODIES

MONOCLONAL	***POLYCLONAL***
Arise from a single	AB arise from diff
Clone of plasma cell	clone of plasma cells
MULTIPLE MYELOMA	

Immunoglobulin



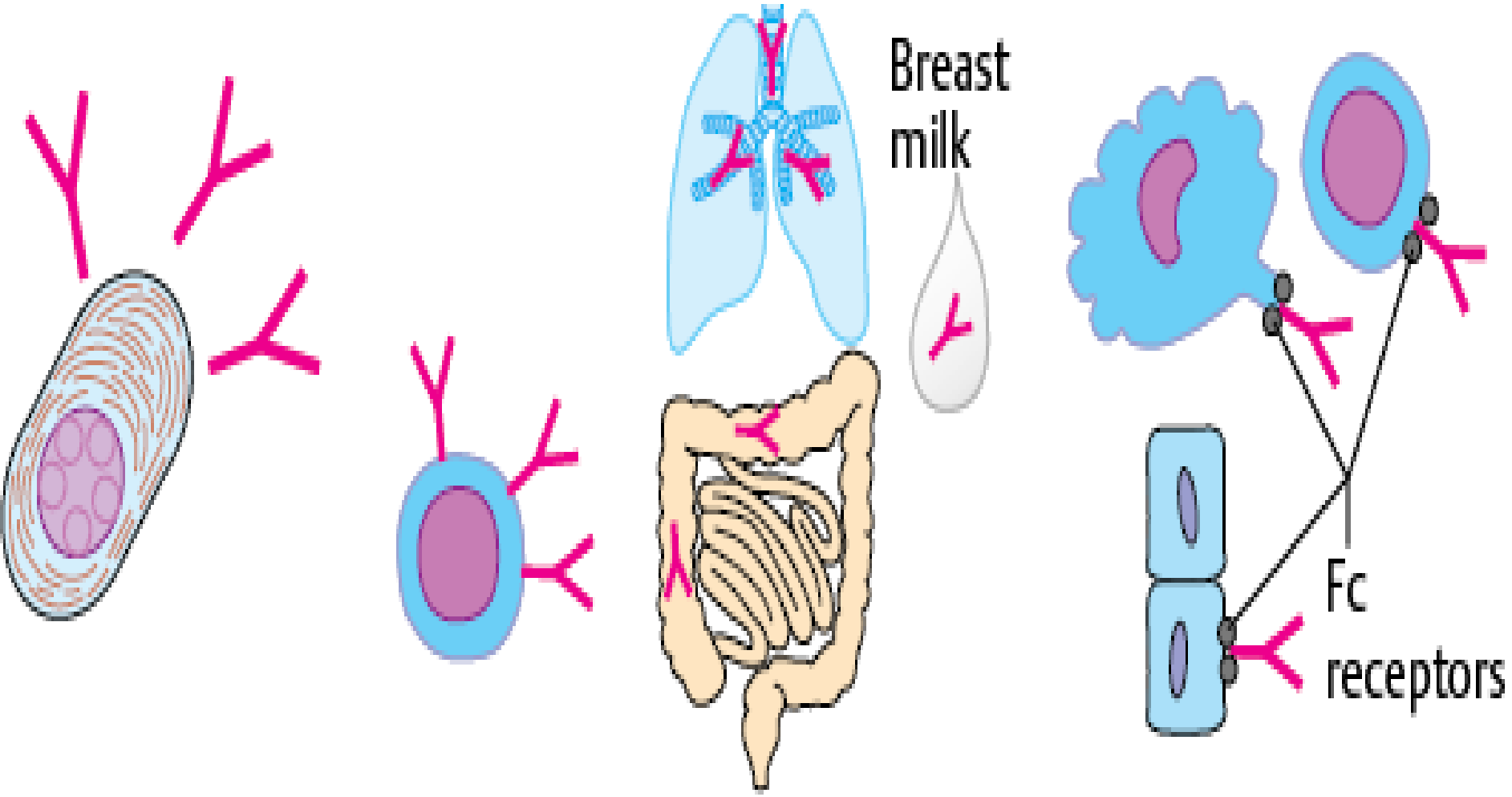




CDR = complementarity-determining region
Fab = antigen-binding fragment
Fc = crystallizable fragment

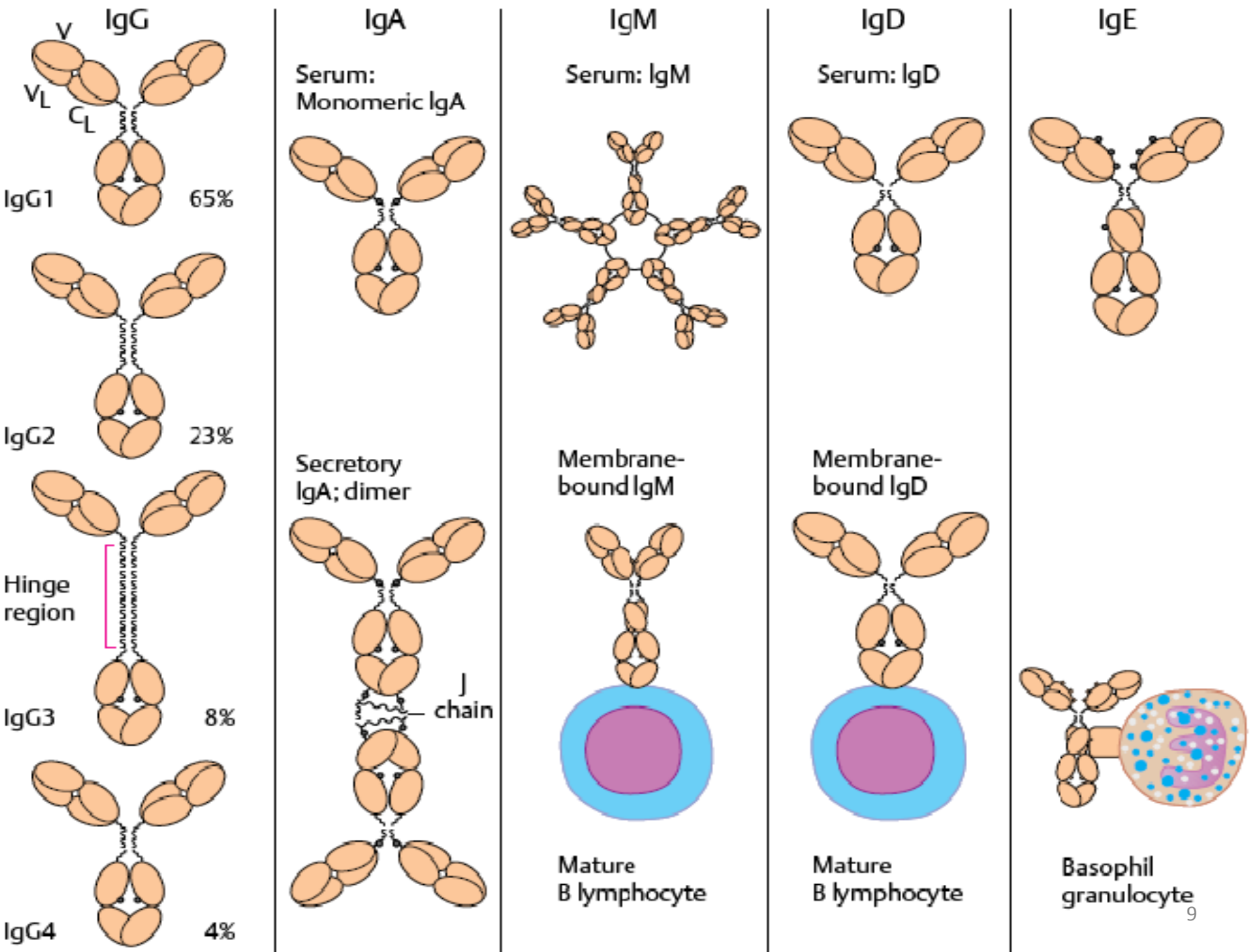
V_H = variable domain of heavy chains
V_L = variable domain of light chains
$C_{H/L}$ = constant domain of heavy / light chains

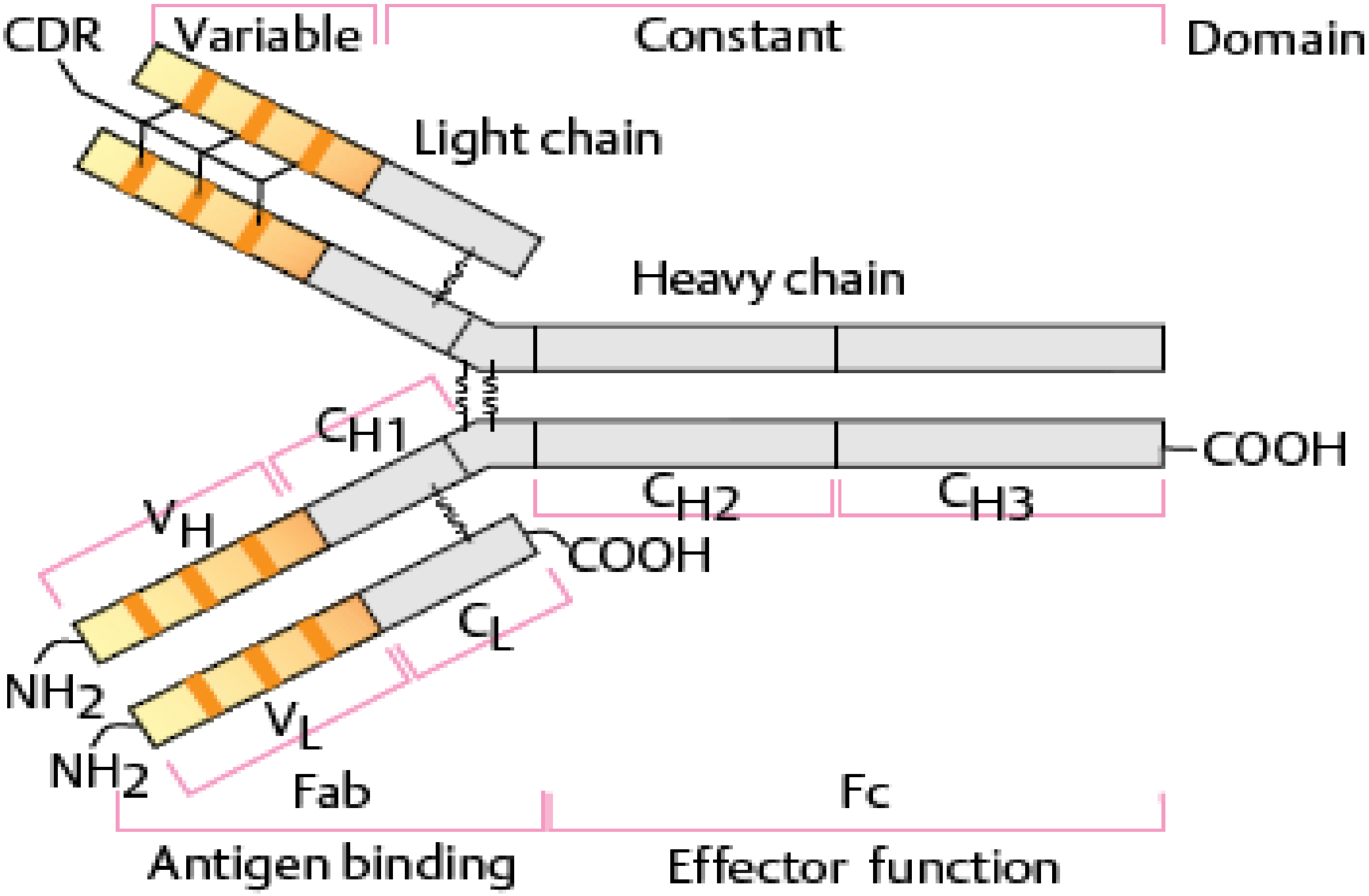
A. Immunoglobulin structure



1. Circulating Ig
2. Membrane-bound Ig
3. Secretory Ig
4. Cell-bound Ig

B. Different immunoglobulin types


IgG
V
V_L
C_L
IgG1
65%
IgG2
23%
Hinge region
IgG3
8%
IgG4
4%
IgA
Serum: Monomeric IgA
Secretory IgA; dimer
J chain
IgM
Serum: IgM
Membrane-bound IgM
Mature B lymphocyte
IgD
Serum: IgD
Membrane-bound IgD
Mature B lymphocyte
IgE
Basophil granulocyte


CDR
Variable
Constant
Domain
Light chain
Heavy chain
C_{H1}
COOH
C_{H2}
C_{H3}
V_H
COOH
C_L
NH_2
V_L
NH_2
Fab
Fc
Antigen binding
Effector function

IMMUNOGLOBULIN STRUCTURE

- Immunoglobulins are **GLYCOPROTIEN** made of
- 4 polypeptide chains:2heavy&2light chains.
- The simpliset AB molecule has **Y** shape.
- The 4 chain are linked by DISULPHID BONDS.
- The term (heavy) and (light)refer to molecular weight .
- 25.000
- 50.000-70.000

IMMUNOGLOBULIN STRUCTURE

- L&H chain are subdivided into VARIABLE and
- CONSTANT regions.
- The light(**L**)chain consist of **1**variable V_l and ONE constant C_l domain for all Abs.
- The(**H**)chain of IgG&IgA consist of ONE variable domain and **3**constants domains.
- The (**H**)chain of IgM&IgE have **1**variable domains and **4** constant domains.

IMMUNOGLOBULIN STRUCTURE

- The variable regions of both **L**&**H** chains are responsible for ANTIGEN-BINDING.
- The constant region of **heavy** chain are responsible for variable biological function .
- The constant region of the **light** chain has no known biological function.
- The **L** chain belong to one of 2 types (kappa)or (lambda)on amino acid difference .

IMMUNOGLOBULIN CLASSES
IgG

- IgG is Divalent: it has 2 identical antigen-binding sites.
- There are :1gG1,IgG2,IgG3,IgG4.
- IgG is the predominant AB in the secondary response against bacteria and viruses.
- IgG is the only AB to cross the **placenta**.
- IgG can activate the complement.
- IgG is immunoglobulin that **OPSPNIZES.**

IMMUNOGLOBULIN CLASSES
IgM

- IgM is the main immunoglobulin produced early in the ***PRIMARY RESPONSE***.
- It is present as monomer on the surface of all **B** cells.
- In the serum it is present as ***PENTAMER*** has ***10*** antigen –binding sites.
- It **DOES NOT** cross the **PLACENTA.**
- FIX complement.

IMMUNOGLOBULIN CLASSES
IgA

- IgA is the main immunoglobulin in secretion such as COLOSTRUM,SALIVA,TEARS,RESPIRATORy,
- INTESTINAL AND GENITAL TRACT secretion
- Secretory IgA prevents attachment of bacteria and viruses to mucous membrane.
- DOES NOT fix complement.

IMMUNOGLOBULIN CLASSES
IgE

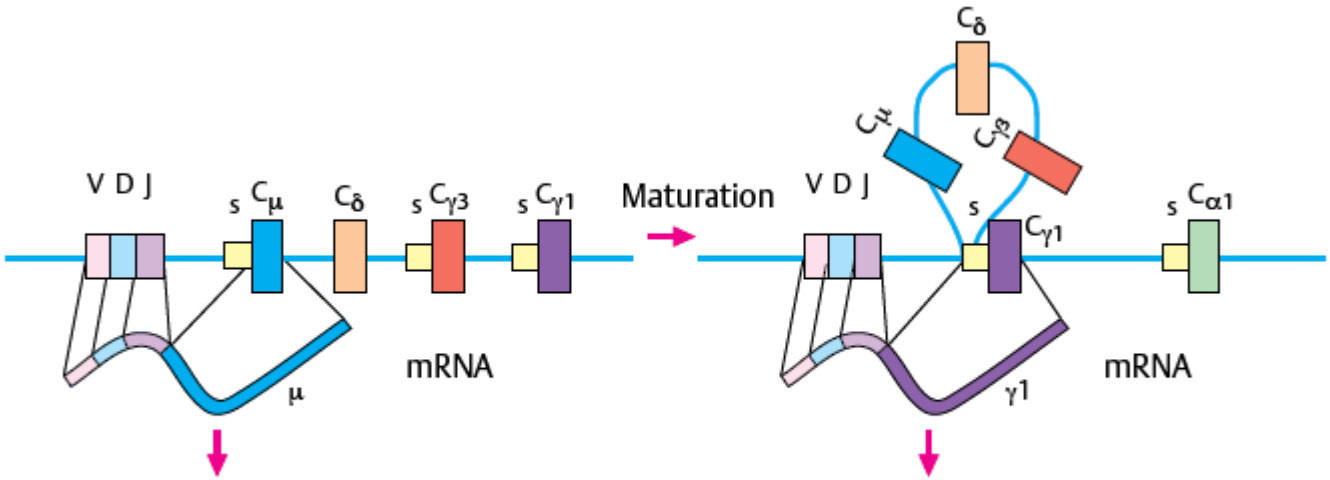
- IgE mediates immediate hypersensitivity reaction by causing release of mediators as Histamine from ***MAST*** cells and ***BASOPHILS*** after exposure to antigen(allergen).
- IgE specific for worm protein binds to receptors on ***ESINOPHILS*** which release worm destroying enzyme.
- DOES NOT fix complement.

IMMUNOGLOBULIN CLASSES
IgD

- Uncertain.
- Found on surface of many **B** cells as well as in the **SERUM**.
- It present in small amount in the **serum**.

IMMUNOGLOBULIN CLASS SWITCHING (**Isotype switching**)

- Initially, all B cells carry IgM specific for an antigen and produce IgM antibody in response
- To exposure to that antigen, later gene rearrangement permits the elaboration of
- Antibodies of the same antigenic specifity but of different immunoglobulin classes e.g will produce IgG,IgA or IgE.



D. Immunoglobulin class-switching

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