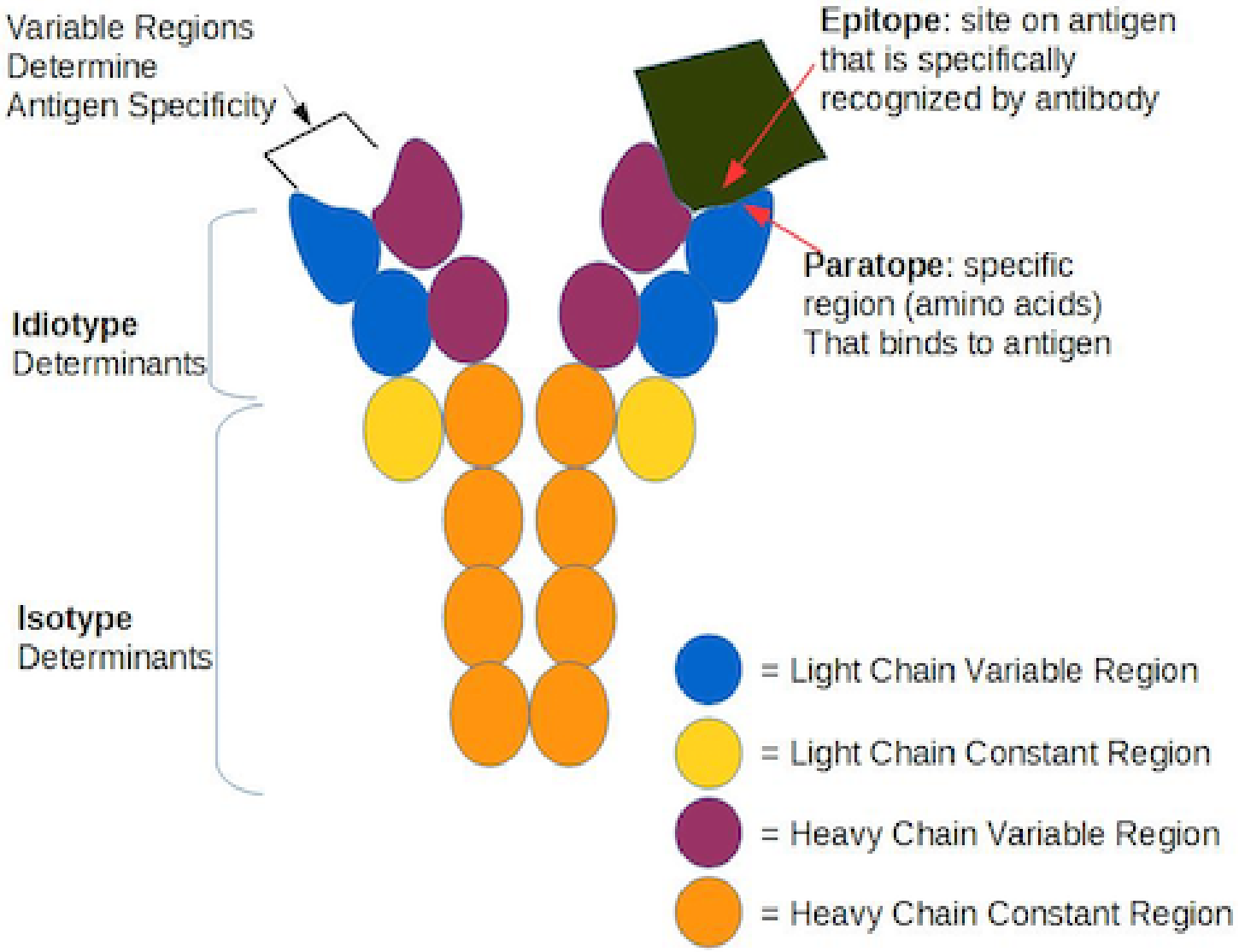
Figure 1. Antibody Structure



Antibodies Act As Immunogens

- Antigenic Determinants on Abs Fall in 3 Categories
  - Isotypic
  - Allotypic
  - Idiotypic
- Isotypic
  - Constant Region Of Ab
  - If you inject Ab in a different species Anti-Isotype is generated
  - If within same species, No Anti-isotype

The 5 Antibody Classes (or isotypes)

- **There are five classes of antibodies:**
- Each class, or **isotype** of antibody has a different Fc region
- The 5 isotypes are IgG, IgA, IgM, IgE and IgD
- The different Fc region carries out different biological functions, which are distinct from antigen binding.
- IgG, IgD and IgE are monomeric
- IgA is a dimer
- IgM is a pentamer

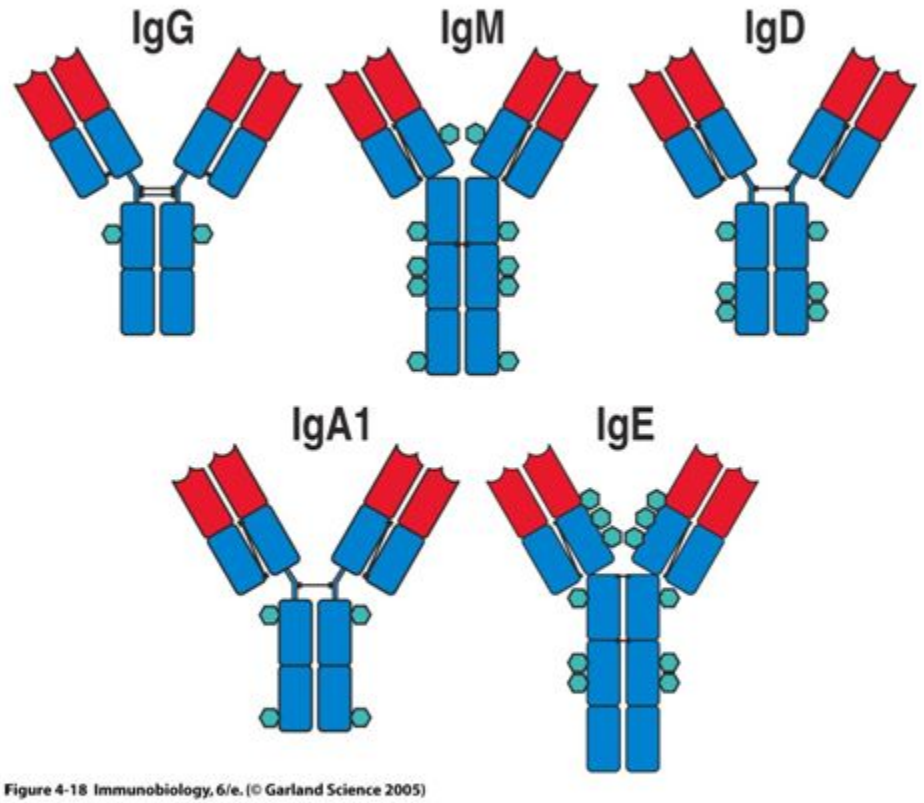
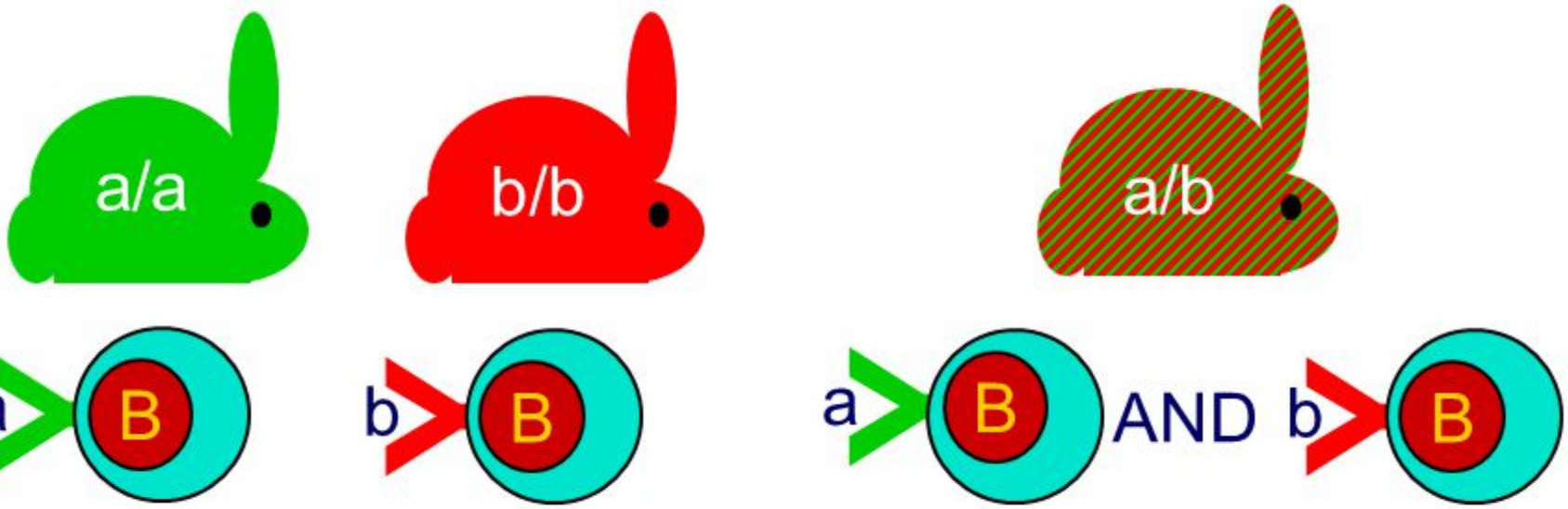


Figure 4-18 Immunobiology, 6/e. (© Garland Science 2005)

Evidence for allelic exclusion

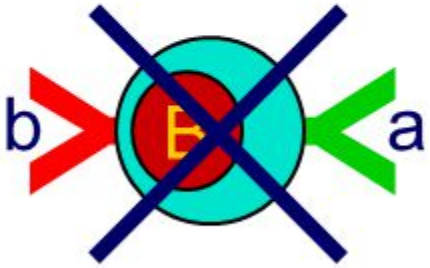
ALLOTYPE- polymorphism in the C region of Ig – one allotype inherited from each parent

Allotypes can be identified by staining B cell surface Ig with antibodies



Suppression of H chain rearrangement by pre-B cell receptor prevents expression of two specificities of antibody per cell

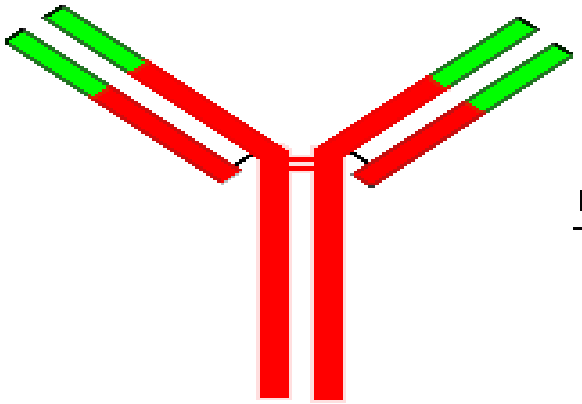
(Refer back to Dreyer & Bennet hypothesis in Molecular Genetics of Immunoglobulins lecture topic)



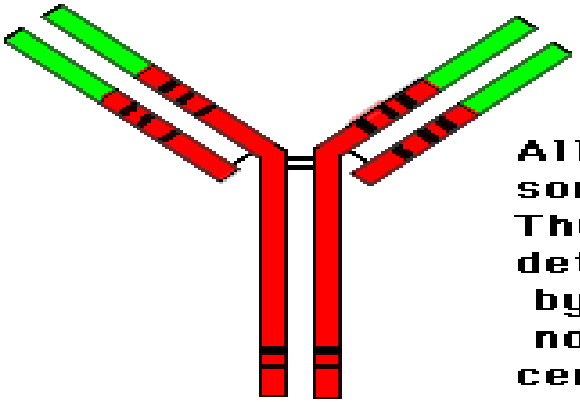
Idiotype Vaccine

- **Definition**:- vaccine contain Antigenic – determinants Ag- specific Ab. Which bahave like epitopes similar to the epitopes present on primary Ag (recognized by receptor on lymphocyte)
- **Importance**
  - V region marker
  - Regulation of immune responses

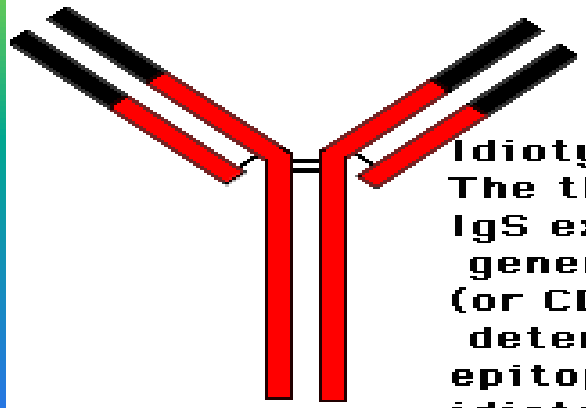
Antigenic Properties of antibodies



Isotypic determinant of C regions. They are found in all animals of the same species.



Allotypic determinant of C region. Found in some but not all members of the species. Thus, individuals may possess a given determinant. Antibodies can be obtrained by injection of the same species which does not have the determinant. Related to ceratin diseases.

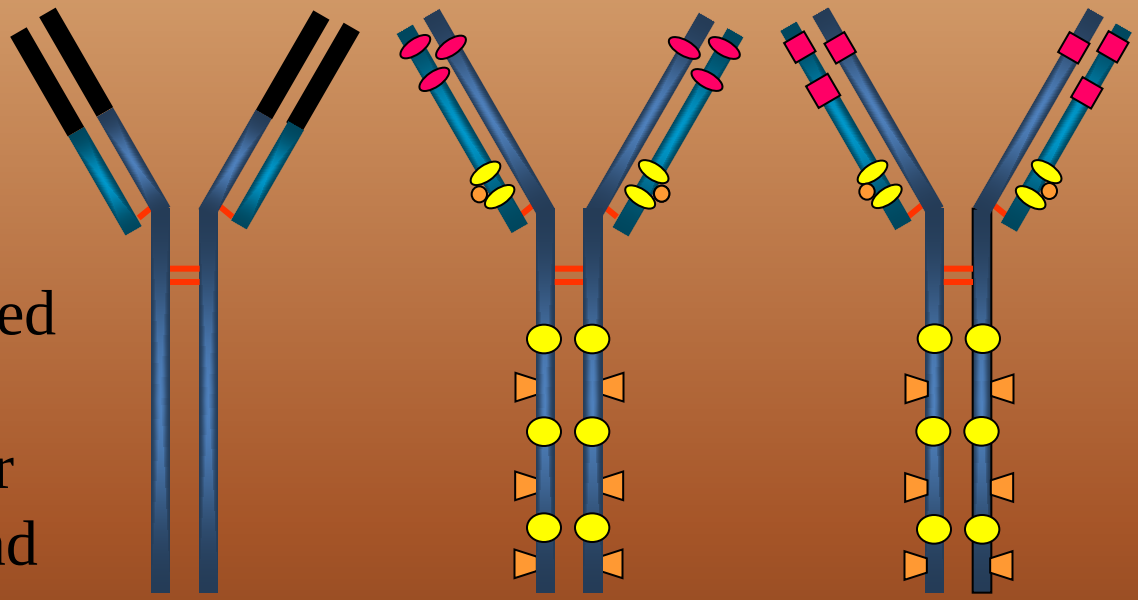


Idiotypic determinants of V regions. The third group of antigenic determinants of IgS exists as a result of unique structures generated by the hypervariable subregions (or CDRs) on the L and H chains. These antigenic determinants are called idiotopes, analogous to epitopes antigens. There are three types of idiotopes:

Immunoglobulin Idiotypes

- **Location**

Idiotypes are localized on the Fab fragment specifically at or near the HVR of heavy and light chains



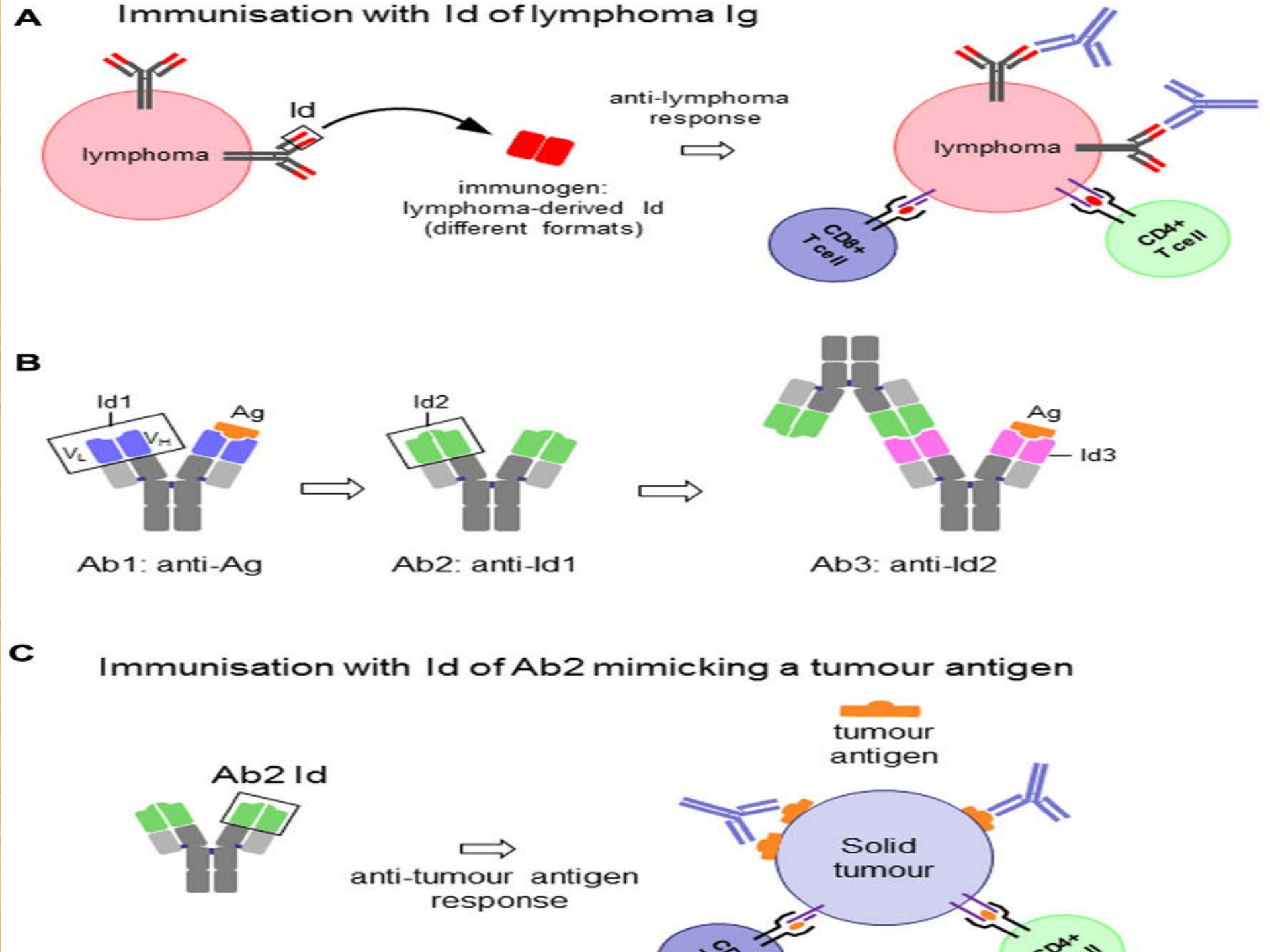
IgG1 (kappa)
Person 1
anti-A

IgG1 (kappa)
Person 1
anti-B

Function of Idiotypes

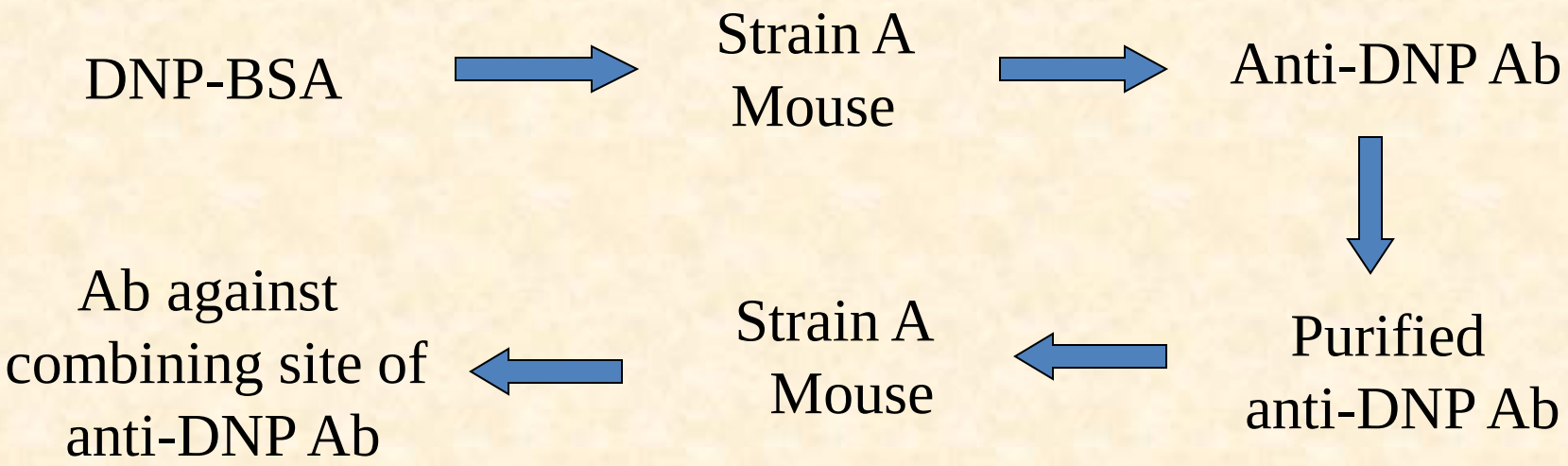
(A) Idiotype (Id) of an immunoglobulin (Ig)-expressing lymphoma cell as vaccine to induce anti-lymphoma immune response.

- (B) Schematic representation of the antigen-specific antibody (Ab1), the antigen (Ag)-mimicking anti-Ab1 anti-idiotypic antibody (Ab2), the anti-Ab2 anti-idiotypic antibody (Ab3) and their interactions.
- (C) Id of an Ab2 as vaccine to induce antigen-specific immune response to solid tumors

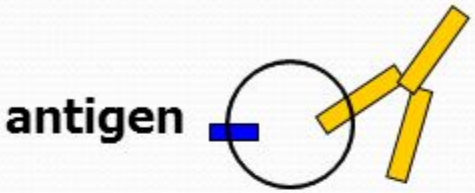

A
Immunisation with Id of lymphoma Ig
lymphoma
Id
immunogen:
lymphoma-derived Id
(different formats)
anti-lymphoma
response
lymphoma
CD8+
T cell
CD4+
T cell
B
Id1
Ag
VL
VH
Id2
Ag
Id3
Ab1: anti-Ag
Ab2: anti-Id1
Ab3: anti-Id2
C
Immunisation with Id of Ab2 mimicking a tumour antigen
Ab2 Id
anti-tumour antigen
response
tumour
antigen
Solid
tumour

Immunoglobulin Idiotypes

DNP-BSA:- (2,4-Dinitrophenylated), (Albumin from Bovine Serum (BSA)



Antigenic determinants created by the HVR = Idiotypes



Antigen may be protein, carbohydrate, etc.

Antigenic determinant

Mice immunized

idiotype1

First antibody selected for high affinity for immunizing antigen, made monoclonal

Anti-idiotype antibodies Raised against idiotype 1

Anti-idiotype 1

like antigen

Anti-idiotype 1

unlike antigen

Second antibodies screened for similarity to original antigen

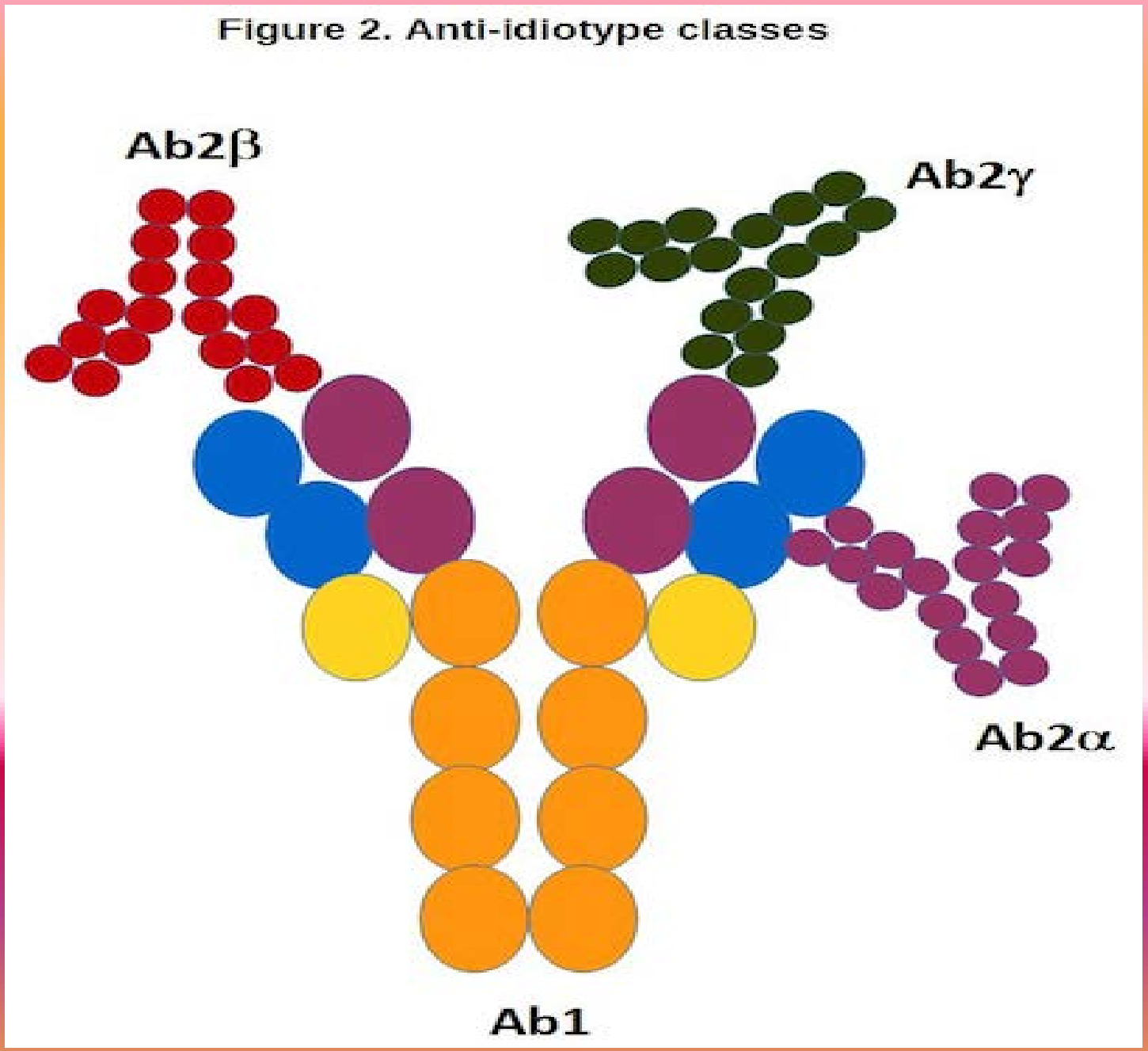
Anti– idiotype:-

Anti– idiotype:- an antibody that binds to the antigen-combining site of another antibody either suppressing or enhancing the immune response

Anti- idiotypes classes

- The key is to understand what class (Figure 2) of anti-id antibody is necessary for the intended applications. Does it need to **functionally block or mimic the target antigen (Ab2β)** **or** **prevent the association of the antibody with its target (Ab2β or Ab2γ),** **or** **does it simply need to uniquely identify the antibody (Abα, Ab2β, or Ab2γ)?** The key to developing the appropriate anti-idiotype is to have a screening strategy that will specifically determine the class of anti-id, generally defined by immunoassay

Figure 2. Anti-idiotype classes



Serum is the fluid obtained when whole blood is separated into its solid and liquid components after it has been allowed to clot. It is clear and yellow in color. **that remains after blood has clotted and cells have been removed.**

Antisera is blood serum containing antibodies against a specific antigen, used to treat or provide immunity to a disease. It is extracted from an animal that has immunity to a particular disease **(Obtained from injecting an animal (horse, rabbit, goat) with antigen (snake venom, botulism or diphtheria toxin).**

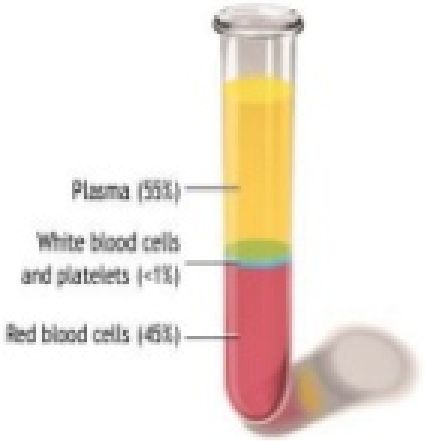
2. Plasma vs. serum

Plasma is the liquid, cell-free part of blood, that has been treated with anti-coagulants.

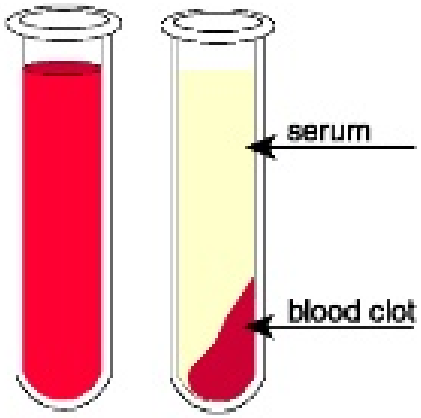
Serum is the liquid part of blood AFTER coagulation, therfore devoid of clotting factors as fibrinogen.

Anticoagulated

Clotted



serum= plasma - fibrinogen



- Blood, fluid pumped by the heart that circulates throughout the body via the arteries, veins, and capillaries

- An adult man of average size normally has about 5.6 liters of blood

- Although blood appears to be red liquid it is actually composed of yellowish liquid called plasma and billions of cells.

What is found in serum?

- It does not contain white or red blood cells or a clotting factor. It is the blood plasma without the fibrinogens. **Serum** includes all proteins not used in blood clotting (coagulation) and all the electrolytes, antibodies, antigens, hormones, and any extra substances such as drugs and microorganisms)

Several lab techniques can be used to determine serum protein. Two proteins in the blood, globulin and albumin, are of particular interest. They typically make up the bulk of the protein in the blood and **the ratio between the two should remain relatively consistent.** Changes in the ratio can be caused by many health conditions. Some conditions linked with changes in serum protein include: dehydration, diabetes, heart failure, kidney disease, tuberculosis, liver disease, autoimmune disease, and blood diseases like leukemia.

Summary

Plasma

- Fluid obtained when anti-coagulated blood has been centrifuged
- Anti-coagulants are needed for separation
- Fibrinogen is present in plasma
- Does not need "standing"; it could be centrifuged as soon as it has been mixed thoroughly.
- plasma is delivered to the patients who lack blood cells

Serum

- Fluid obtained when coagulated blood has been centrifuged
- Anti-coagulants are not needed
- Fibrinogen is absent
- Serum takes a longer time to prepare
- Serum is the most preferred part of blood used in checking blood groups and diagnosis of diseases