



**Cihan University/ Sulaymaniya**

**College of Health Science**

**Medical Laboratory Analysis**

**4<sup>th</sup> Stage- 1<sup>st</sup> Semester**

**Pr. Clinical Immunology**

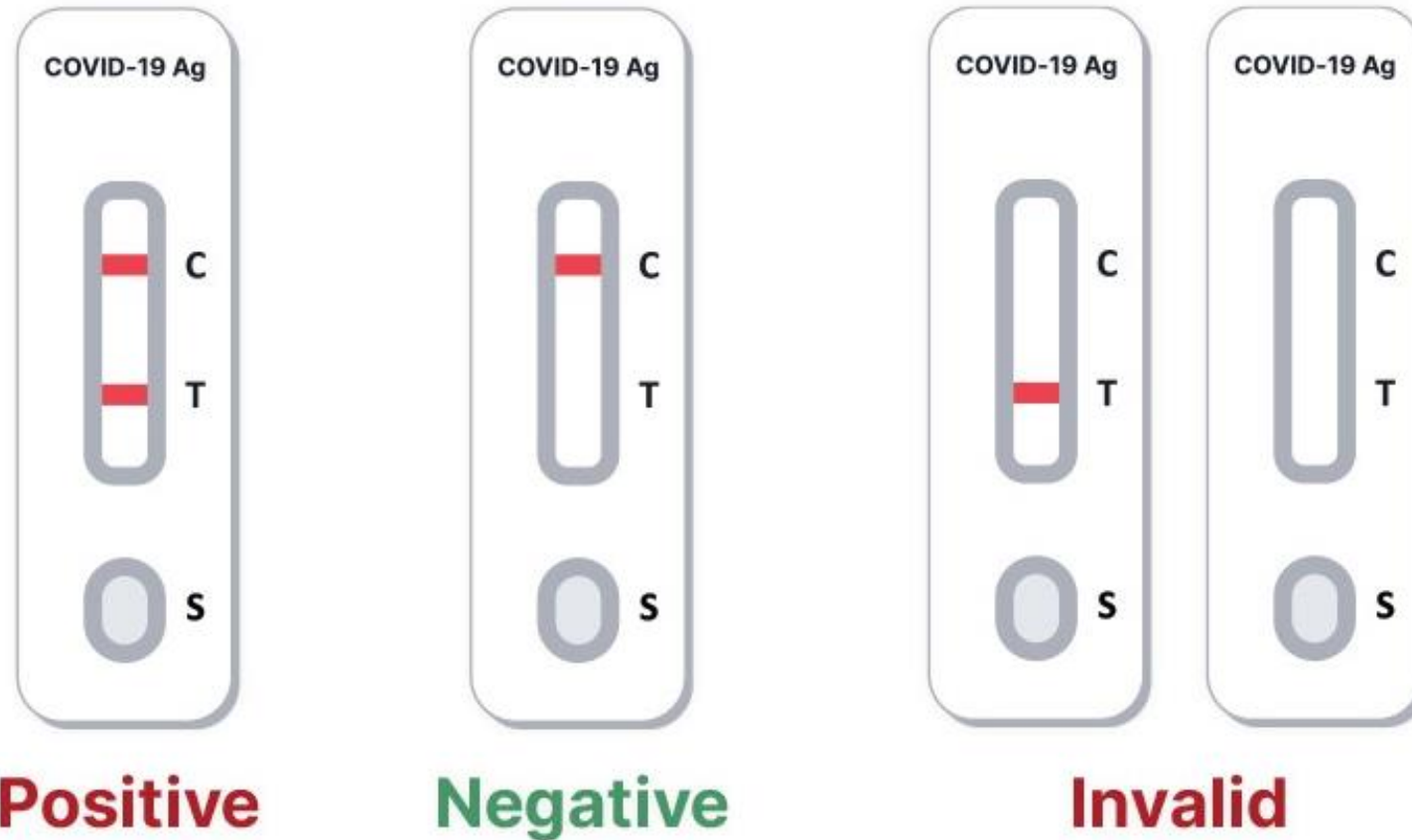
**Lab- 4: Immunoassay/ Serology**

**2023- 2024**

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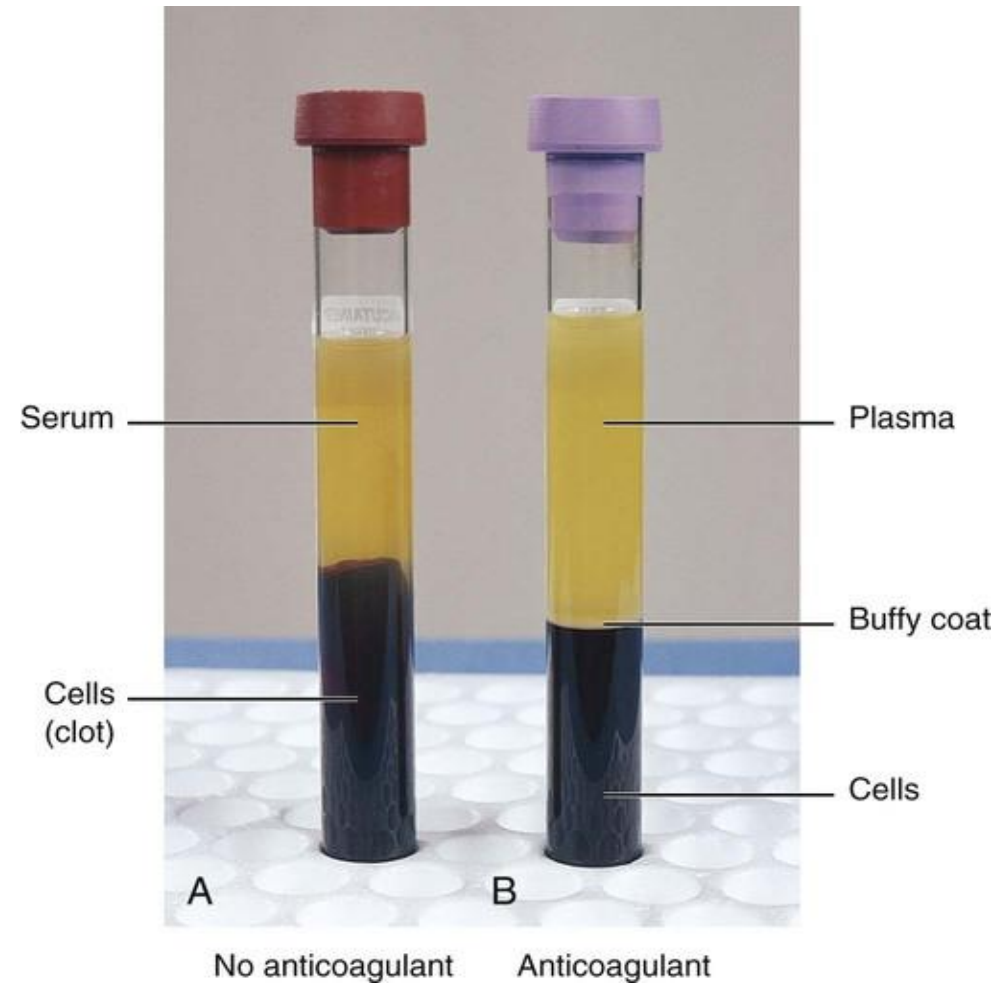
# Immunoassay/ Serology

- To detect antibodies/ antigens.

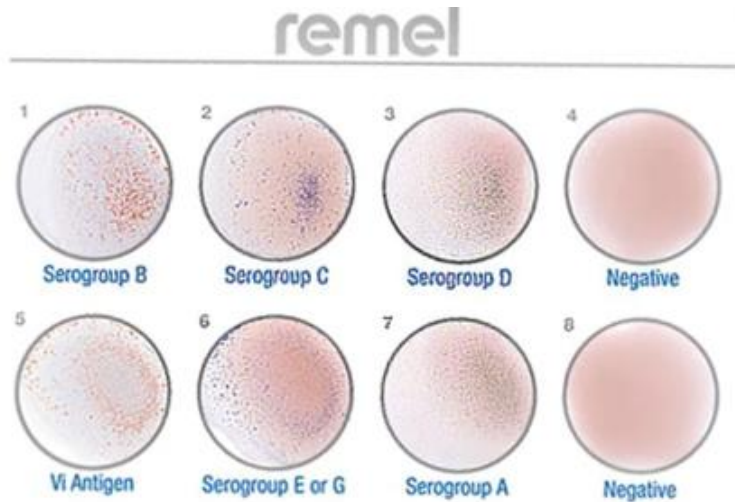


# Immunoassays

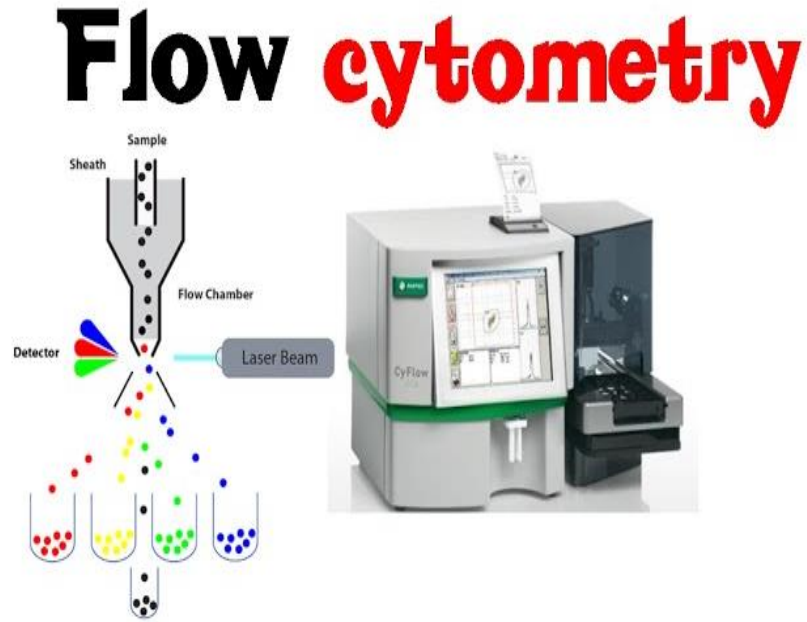
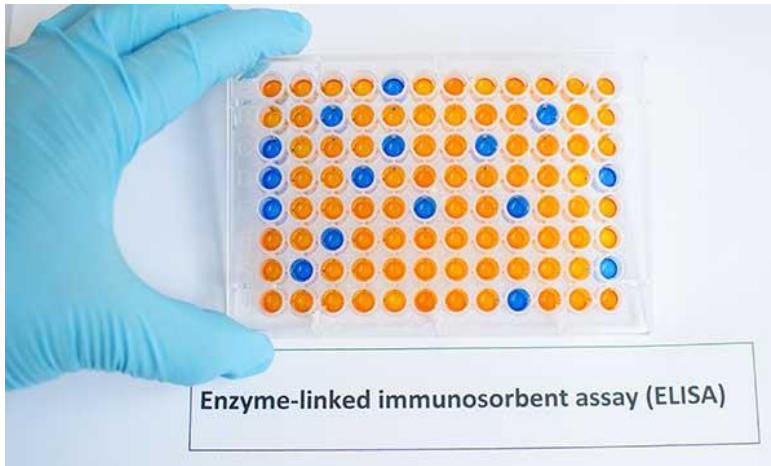
- **Immunoassays**- studies the presence or concentration of molecule (antigen/ antibody) in a **solution** by using antibody/ antigen.
- If the solution is either **blood/ plasma/ serum**.
- **Serology**- studies the presence of **infection and other diseases** by detecting antibody/ antigen in **blood/ plasma/ serum**.



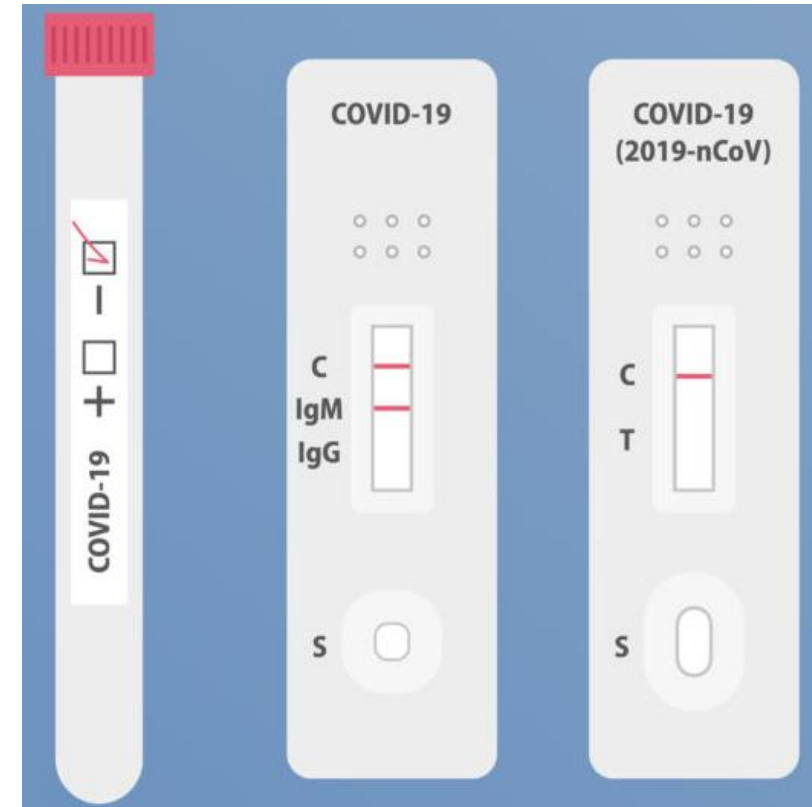
# Example of Immunoassays



Agglutination/ Latex Agglutination Test Kit



Fluorescent Immunoassays-  
Flow Cytometry



Lateral Flow Immunoassay-  
Rapid Strip Test

# Immunoassays

- Use of **antibody** to detect **antigens**.
- Use of **antigen** to detect antibodies.
- Based on the specificity of the interaction between antigen and antibody.
- Antibody can be produced against any type of macromolecules.
- **Production of antiserum-** Antibodies used for **research and diagnostic purpose** are often obtained by injecting a lab animal such as rabbit or a goat with a **specific antigen**.

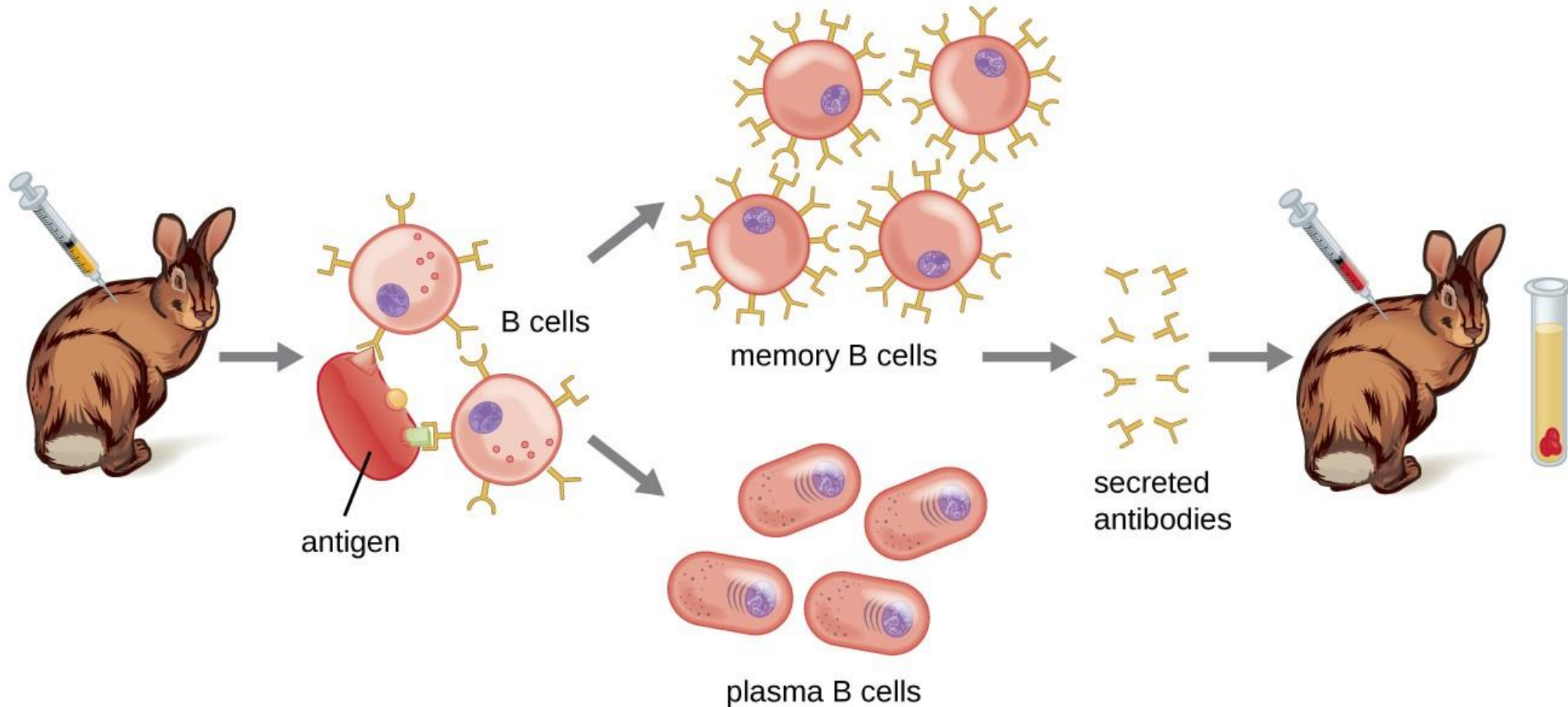
# Production of Antiserum- Antibodies

1 Inject antigen into rabbit.

2 Antigen activates B cells.

3 Plasma B cells produce polyclonal antibodies.

4 Obtain antiserum from rabbit containing polyclonal antibodies.



# Application of Serological Tests

It is widely used for diagnostics purposes in the medical laboratory.

1. Detection of **serum antibodies** to **specific infectious agent**.
2. Identification of **microorganisms (antigen)** in clinical specimen.
3. Protein identification.

# How does Immunoassay/ Serology work

■ Serologic testing may be used in clinical laboratory in two distinct ways:

1. **Direct Serologic testing-** to detect unknown antigen.

✓ Uses a preparation known **antibodies (antiserum)**, to identify an unknown antigen.

2. **Indirect serologic testing-** to detect antibodies being made against a specific antigen in the patient's serum.

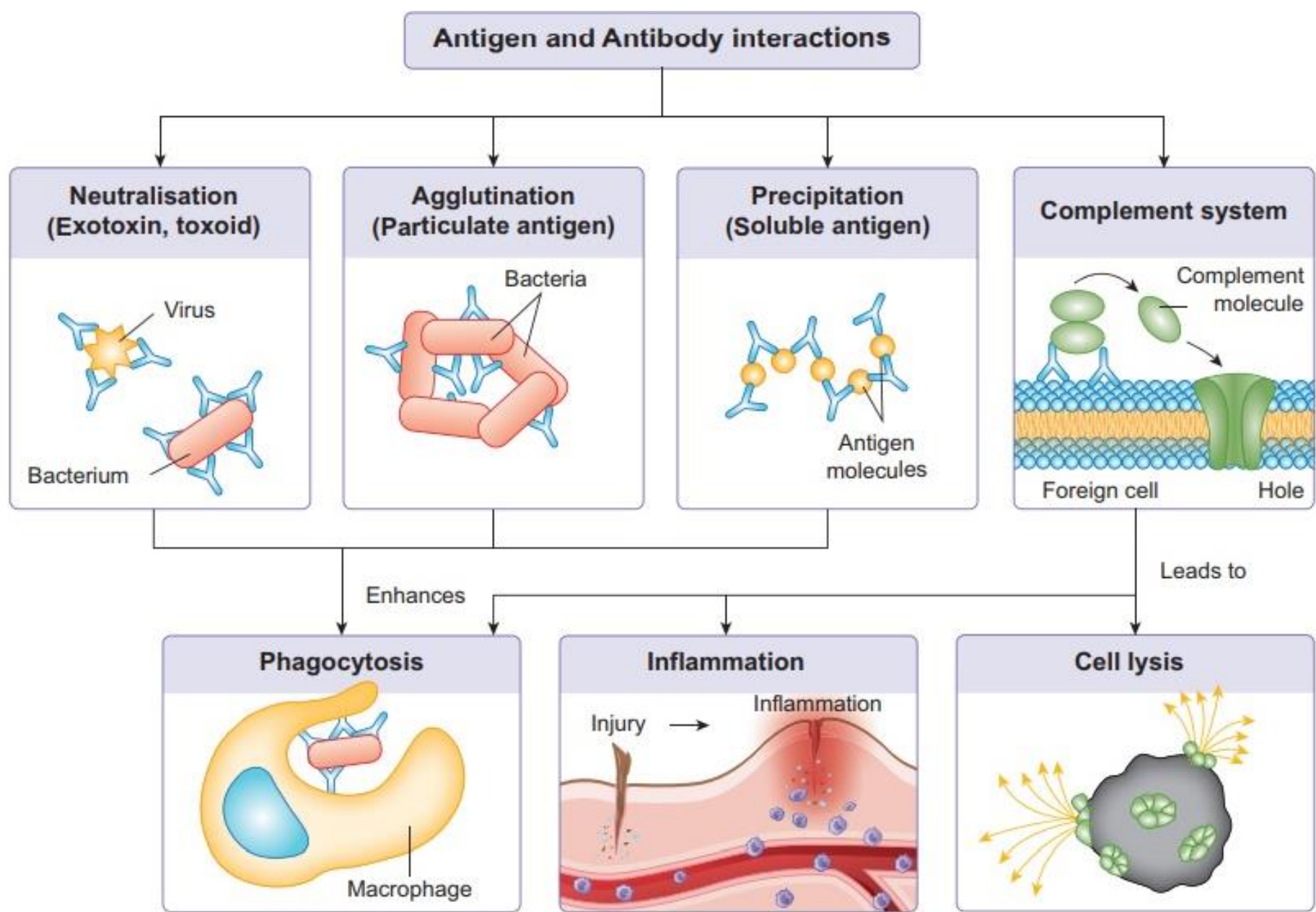
❖ Antibodies in a patient's serum is made by that individual against an antigen associated with a particular disease and are detected using a known antigen.



# Based on the principle that

Antigen- Antibody interactions can result in a variety of consequences:

1. Agglutination of particulate antigen.
2. Precipitation of soluble antigen.
3. Neutralization of toxins and viruses.
4. Activation of complement.
5. Antibody can be labeled:



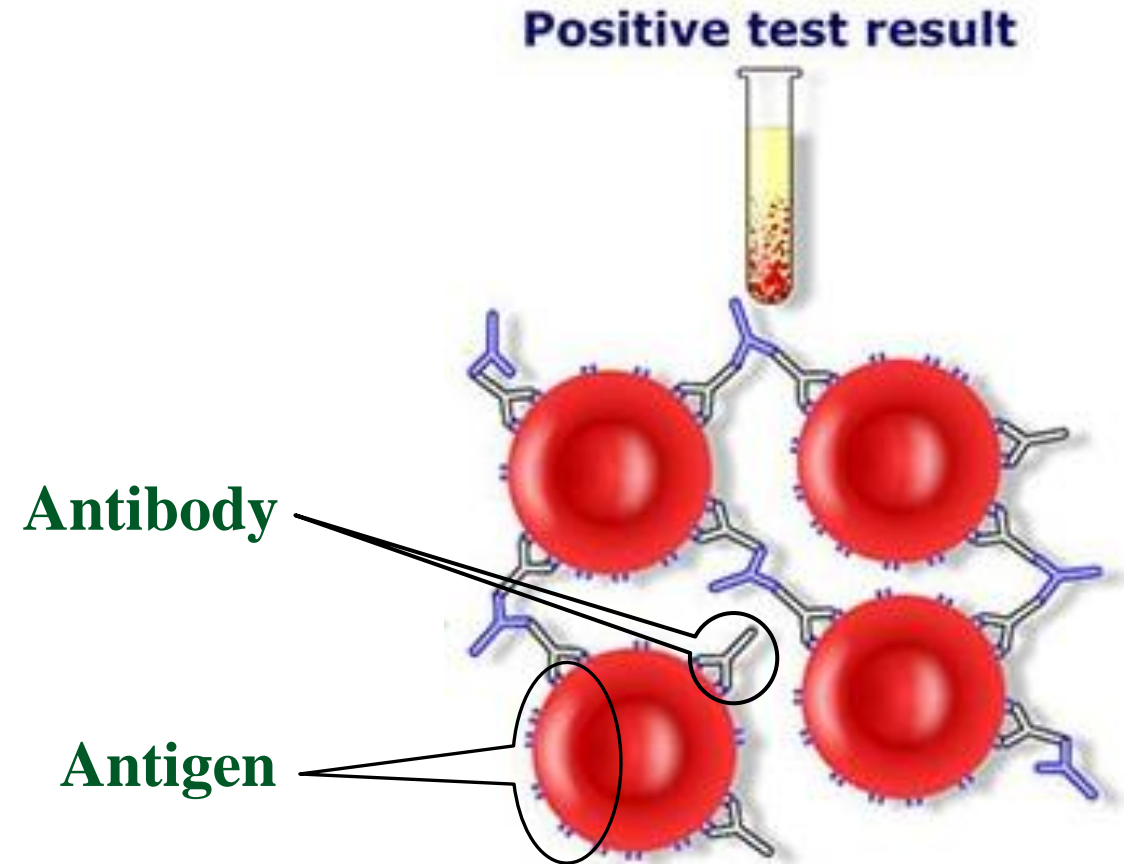
**Fig. 8.8 Antigen and antibody reaction**

# Application of Serological Tests in Clinical Laboratories

- Microbiology Lab.- to determine if a person has:
  1. Antibodies against a specific pathogen.
  2. To detect antigens associated with a pathogen in a person's sample.
- ❖ Serological tests are also used to detect and measure the level of:
- Chemical pathology lab.
  - Hormones
- Toxicology Lab.-
  - Drugs
- Immunology/ Serology Lab.
  - Abnormal antibodies, HLA typing.
- Hematology Lab.
  - White blood cell types.
  - Transfusion medicine- Blood group antigens.

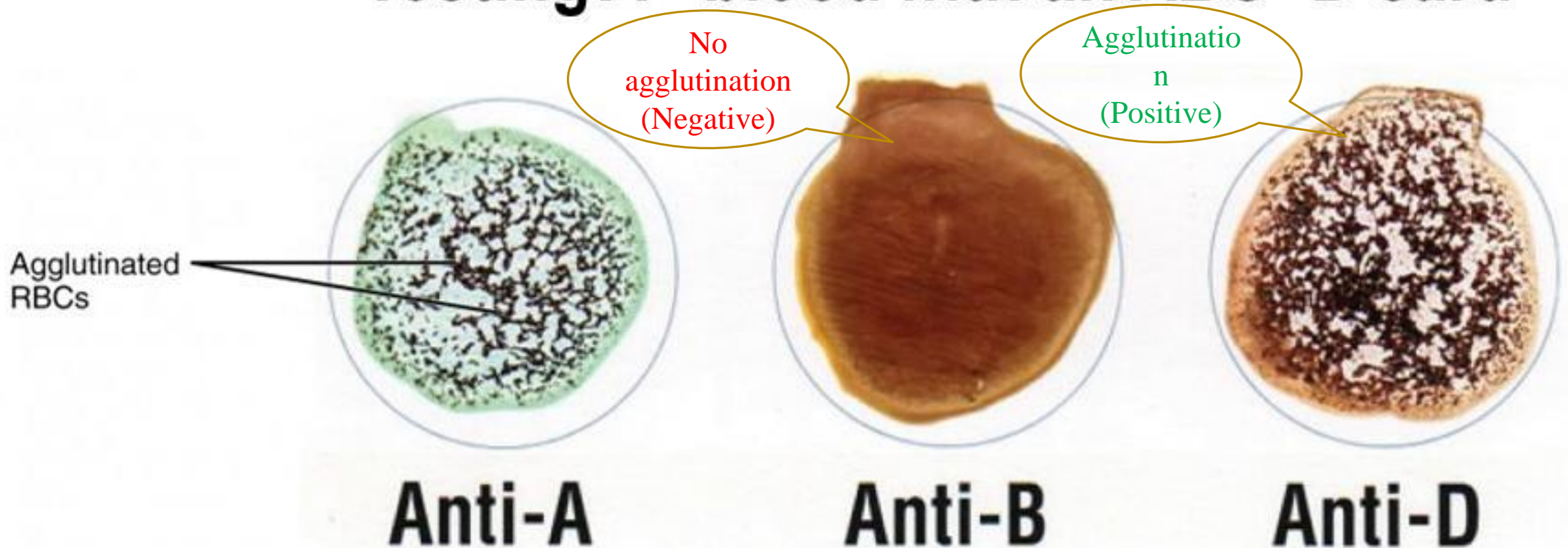
# 1- Agglutination of Particulate Antigen

- Clumping of solid (insoluble) antigen or soluble antigens attached to particles).
- Through the formation of a framework in which antigen particles or molecules alternate with antibody molecules.



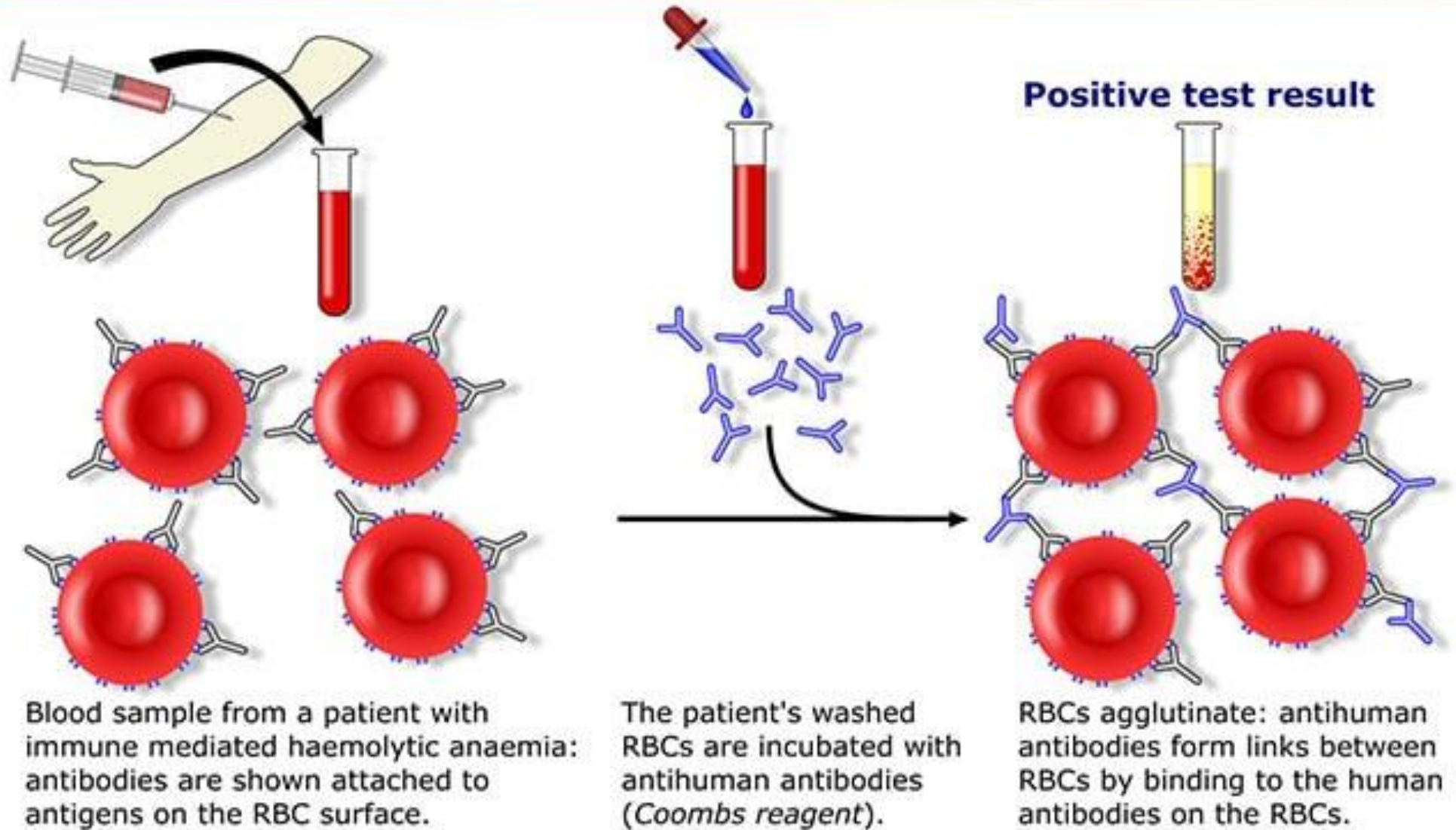
# Example of Agglutination Test

## Testing A+ blood with an ABO+D card

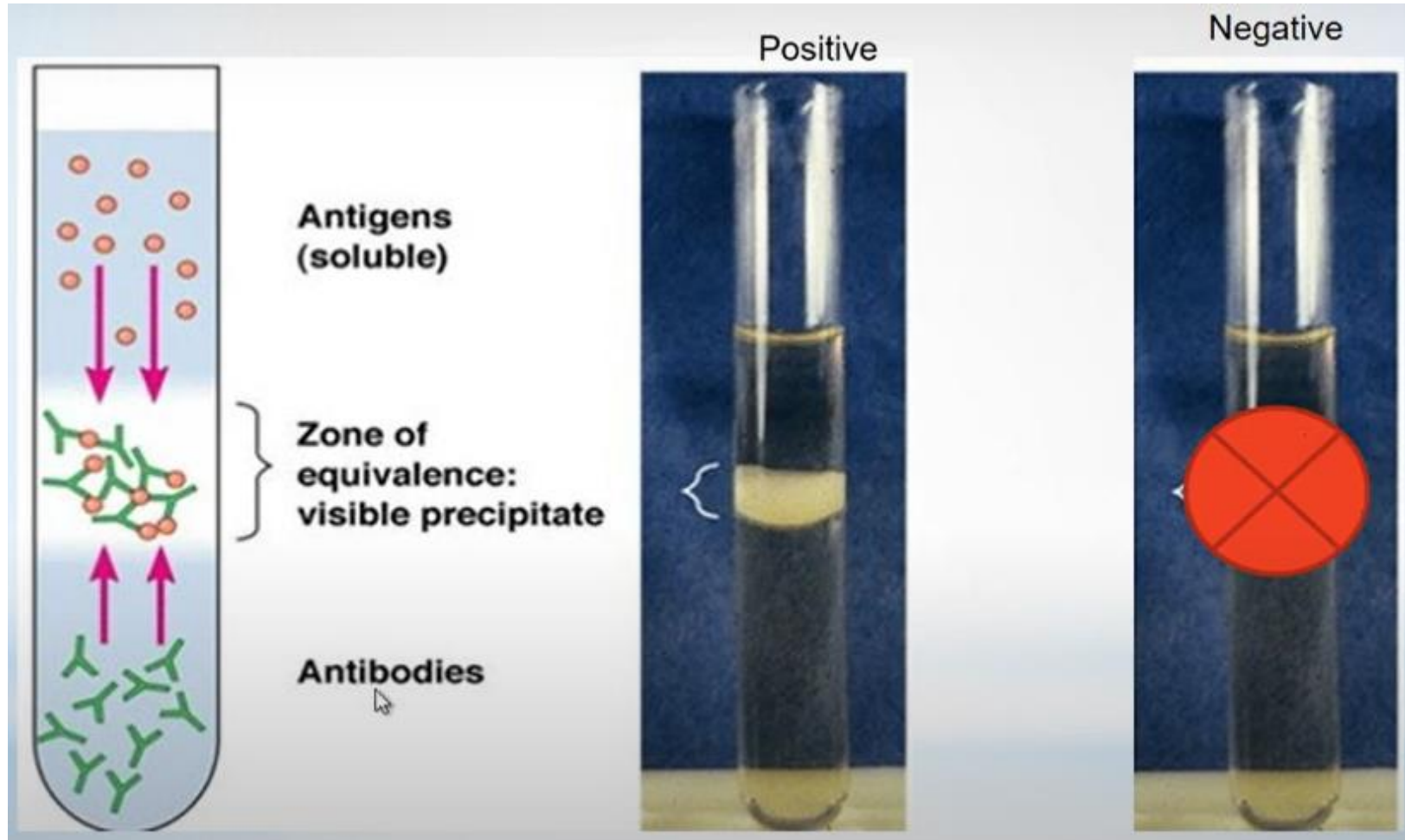


❖ The result is Blood group A positive.

## Direct Coombs test / Direct antiglobulin test

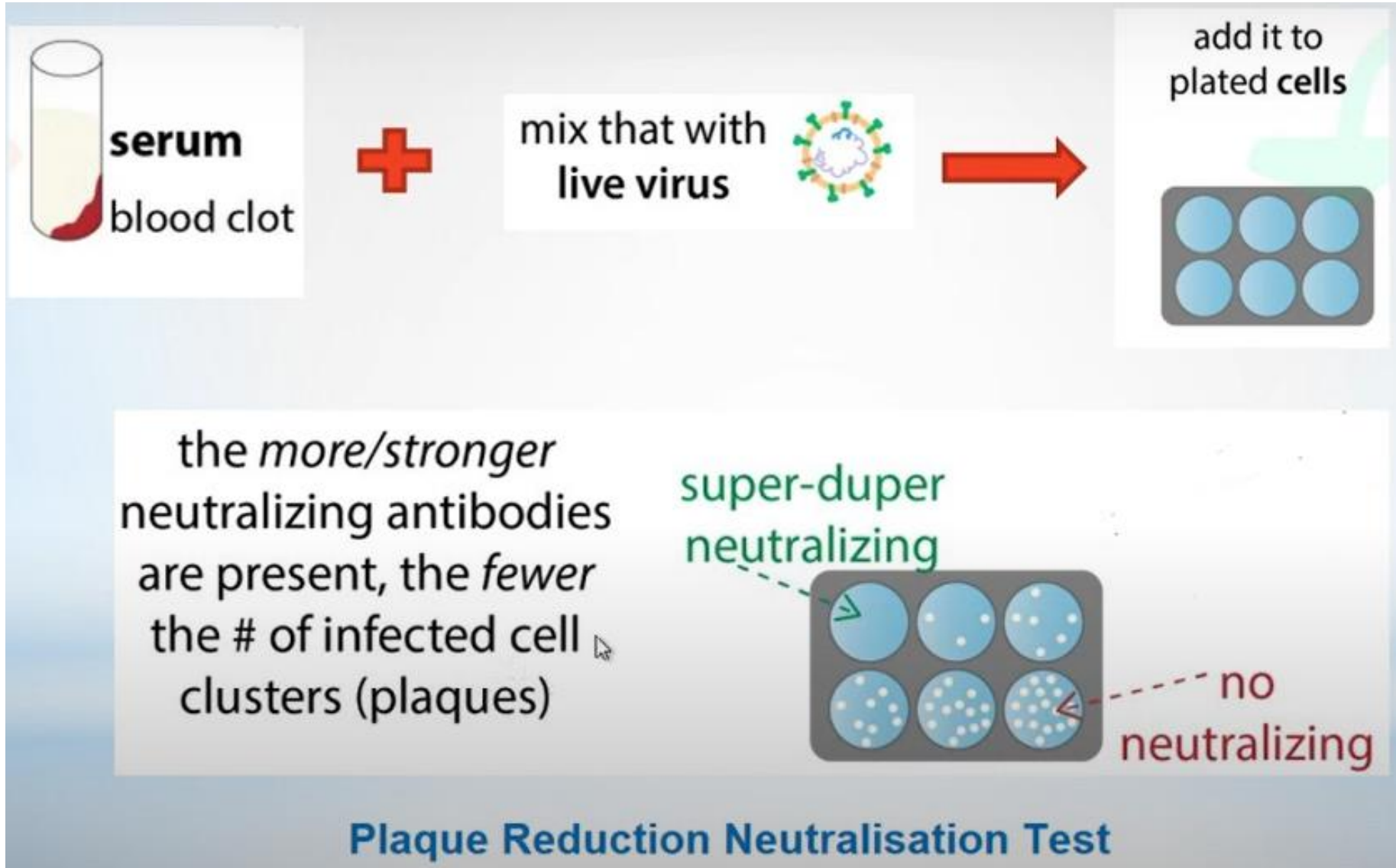


## 2- Precipitation of Soluble Antigen



❖ Toxin identification by tube precipitation test.

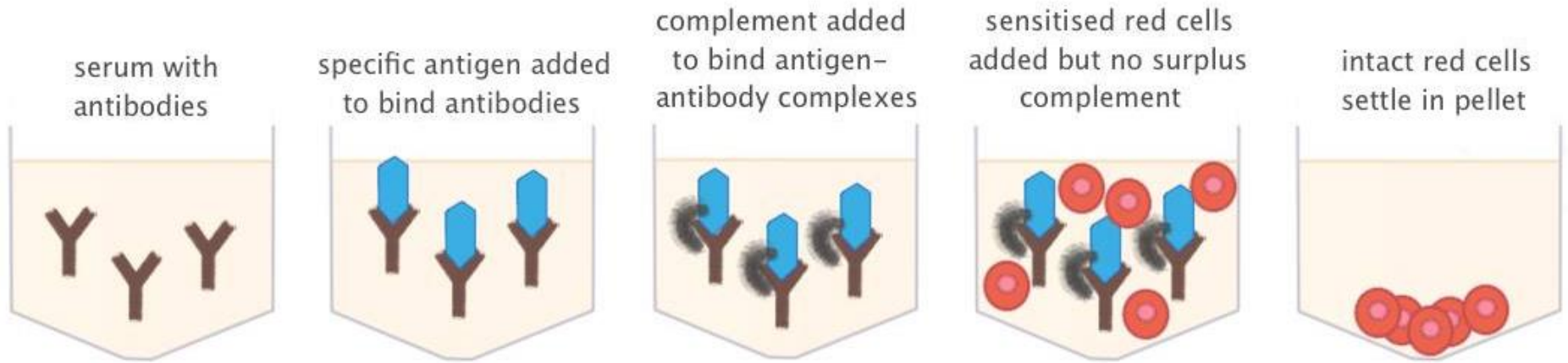
# 3- Neutralization of Toxins and Viruses



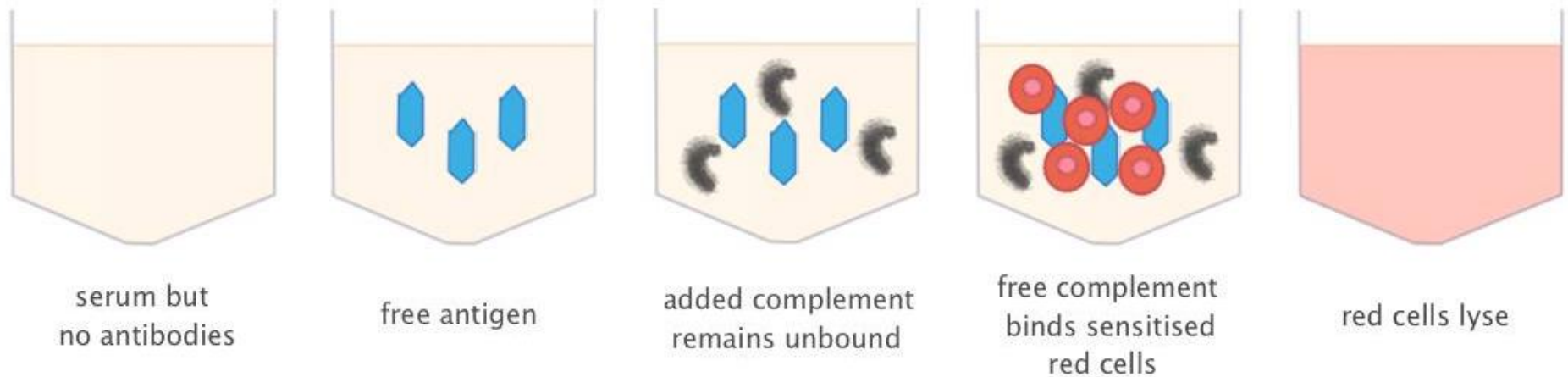


# 4- Activation of Complement

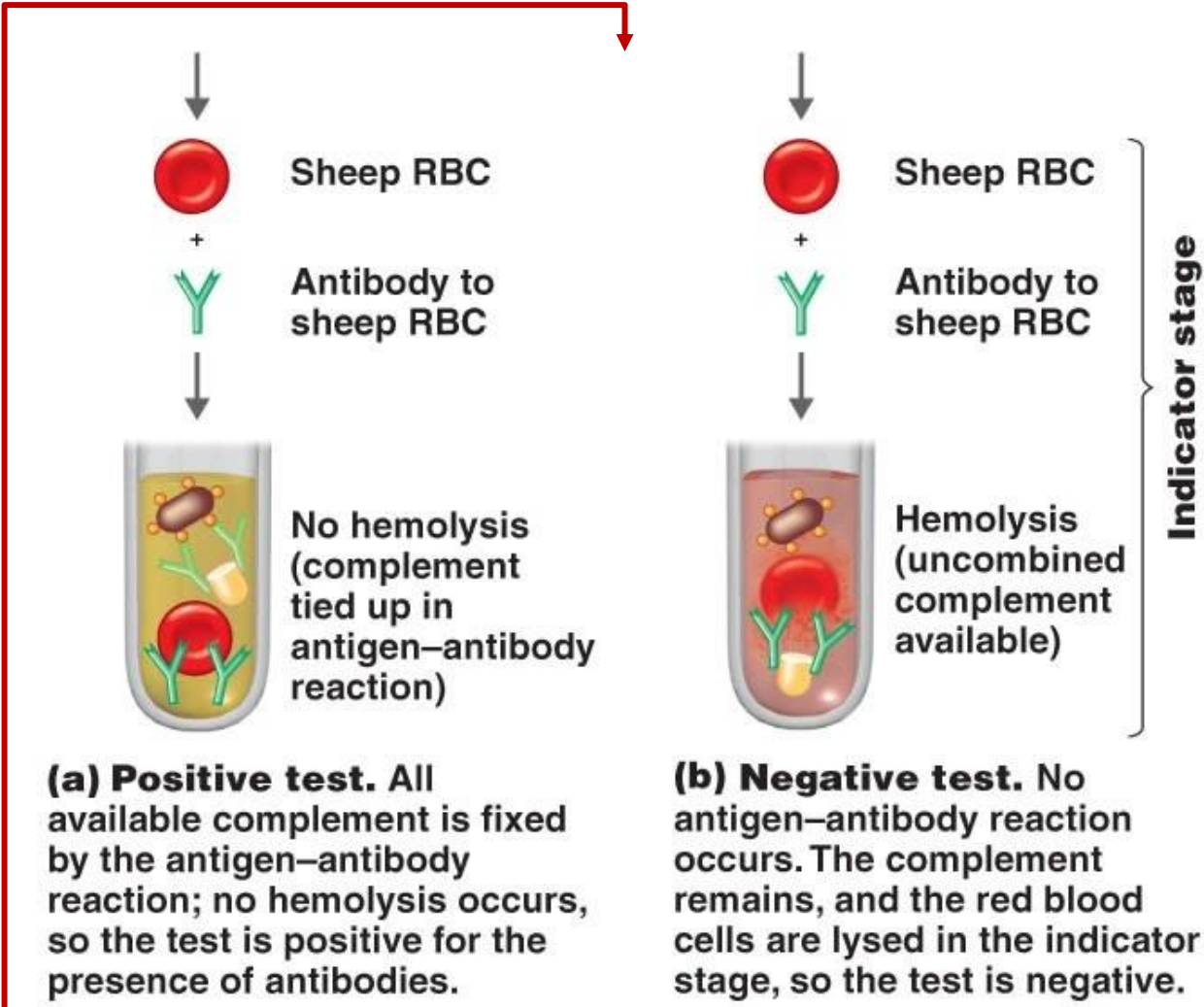
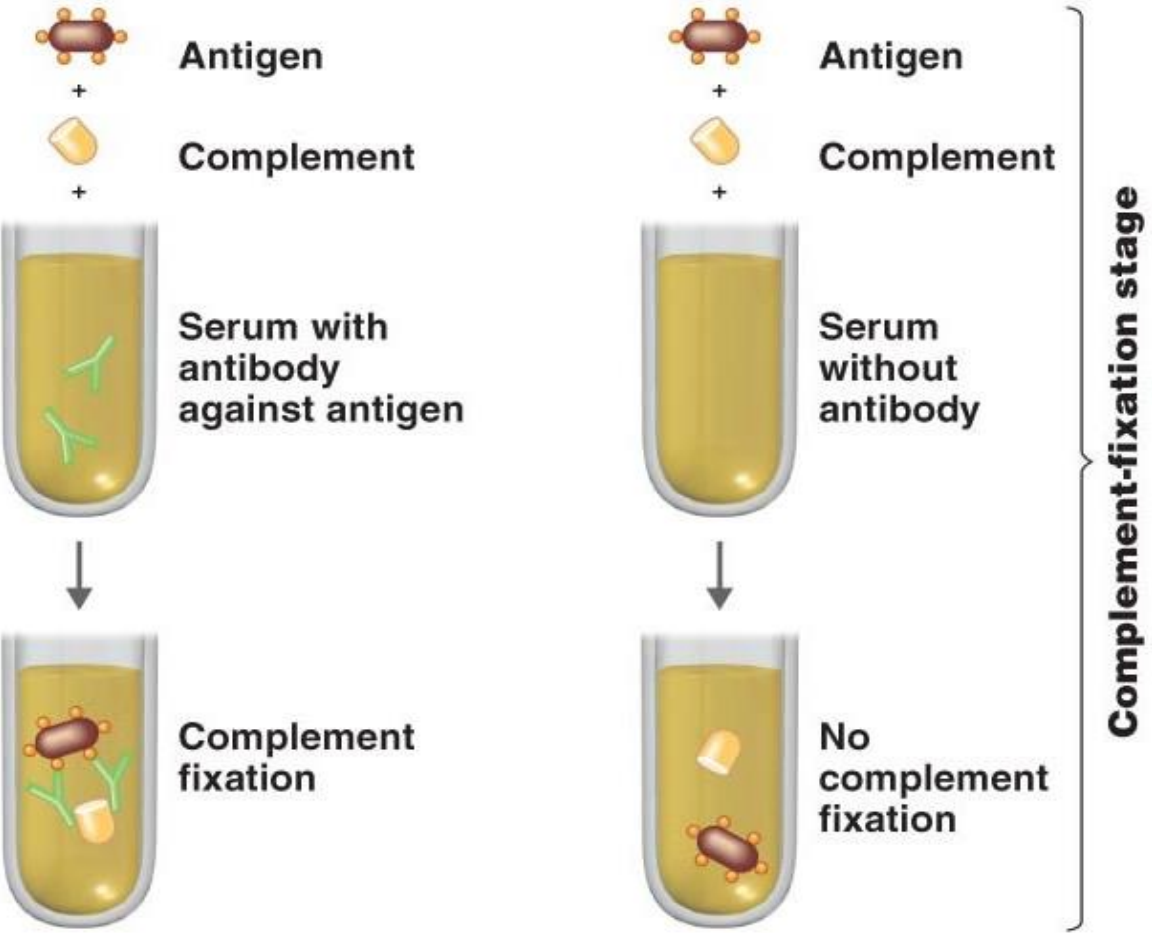
reactive



nonreactive



# Complement Fixation Test



# 5- Antibody can be labeled:

## 1. Small molecules

Signal: Colour, fluorescence light

## 2. particles

Signal: Colour, fluorescence light

## 3. Isotope

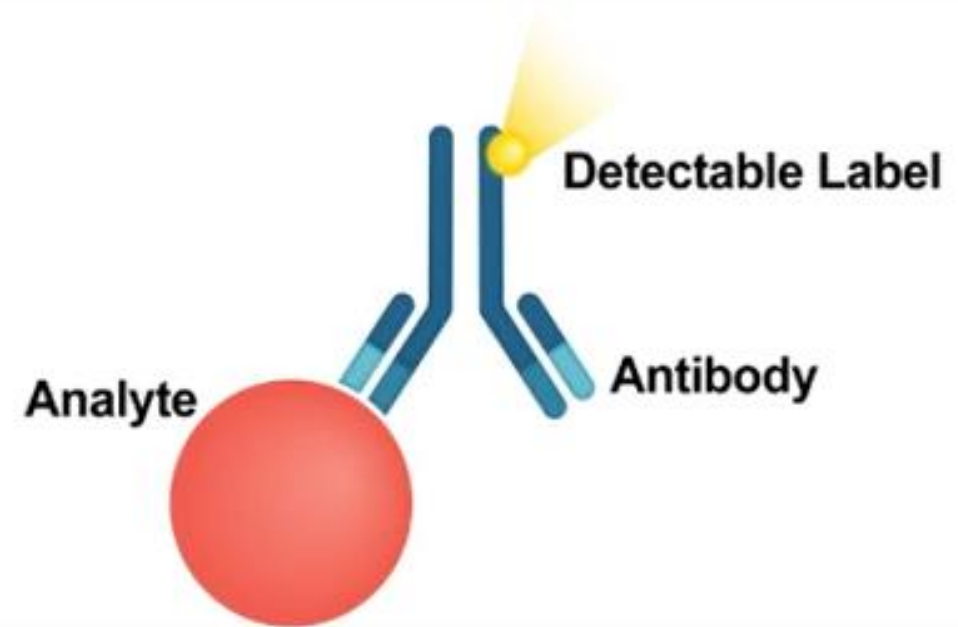
Signal: radioactivity

## 4. Enzymatic protein

Signal: Colour, chemiluminescence light

## 5. Florescent dyes

Signal: fluorescence light



The critical components of an immunoassay: an analyte (antigen), an antibody, and a label that can be detected.

# References

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