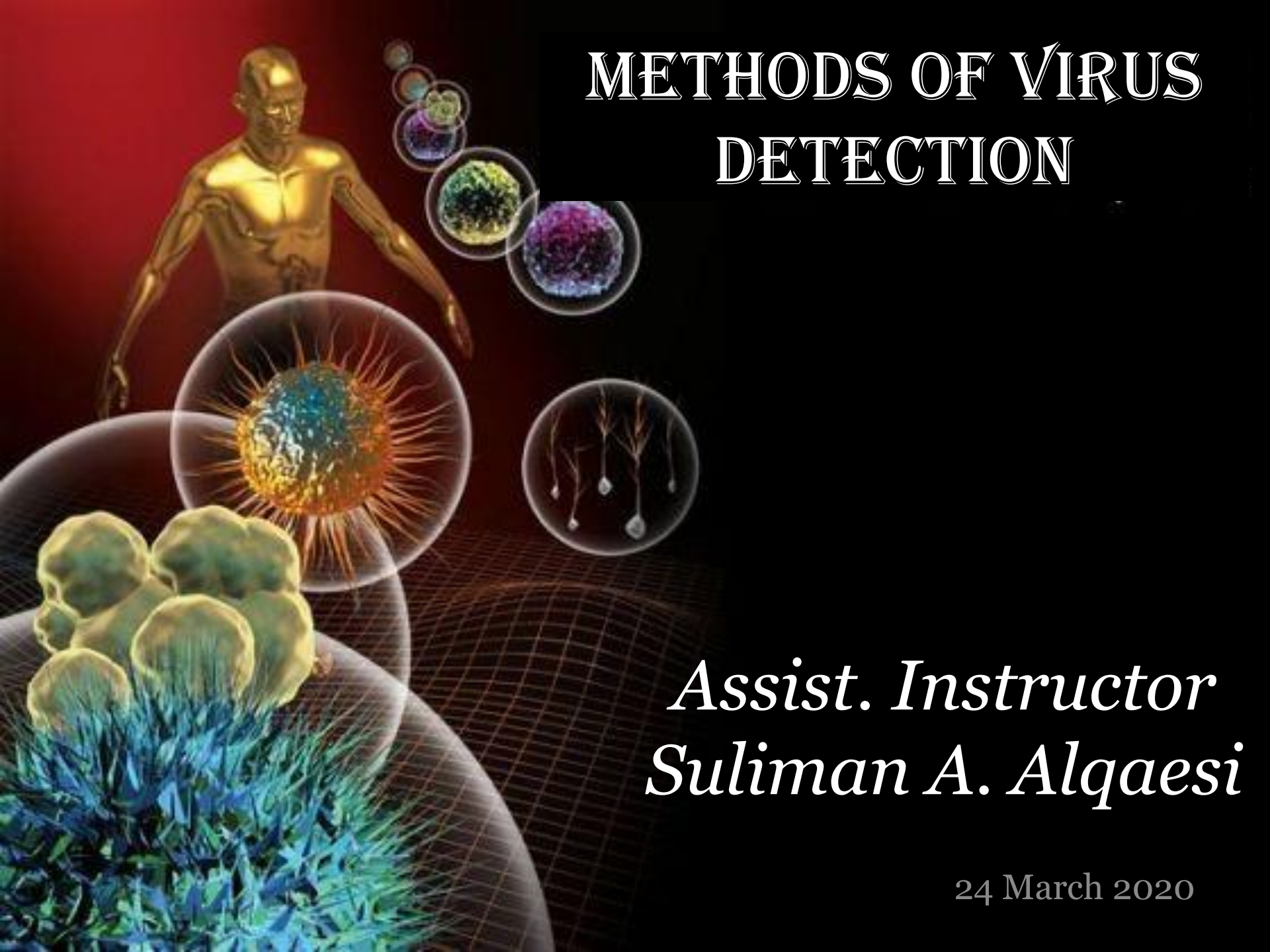

Methods of Virus Detection

Assist. Instructor
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24 March 2020

Definition of a Virus

- *Viruses : obligate intracellular parasite as they lack the machinery necessary for protein and nucleic acid synthesis.*
- *They depend on the host machinery for their growth and survival.*
- *They infect every form of living cells include human, animal, plant, insect, fungus, & bacteria.*

How Do Viruses Differ From Living Organisms?

- *Viruses are not living organisms because they are incapable of carrying out all life processes.*

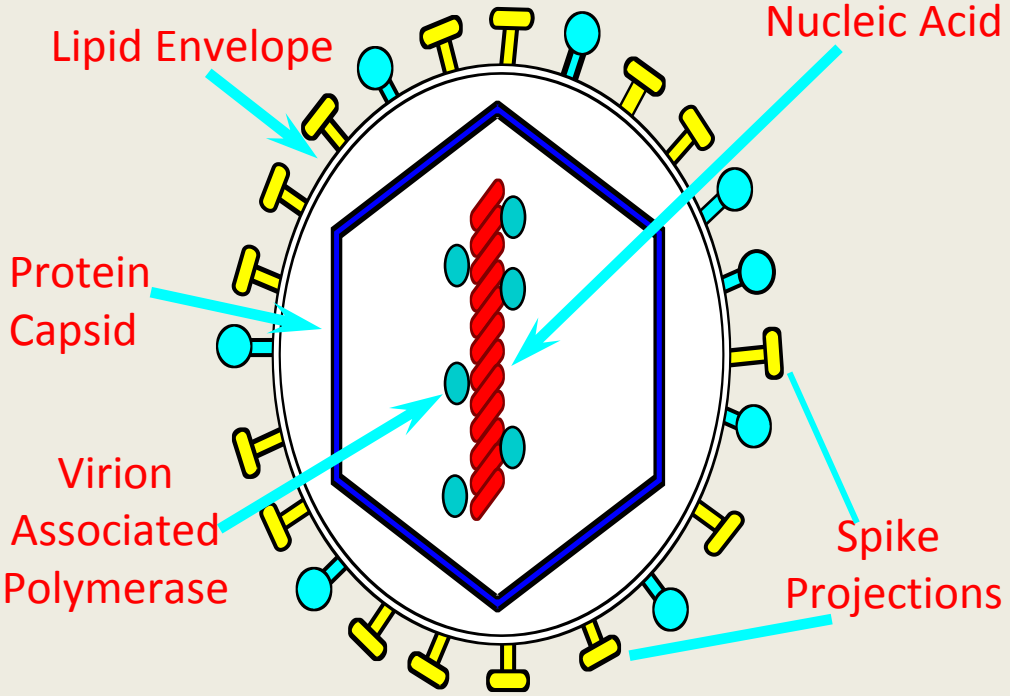
- *Viruses*
  - *are not made of cells.*
  - *can not reproduce on their own.*
  - *do not grow or undergo division.*
  - *do not transform energy.*
  - *lack machinery for protein synthesis.*

The difference between Viruses & bacteria included:

Properties	Viruses	Bacteria
Size	10-300nm	1000nm
Genome	DNA or RNA but not both of them	Both DNA and RNA
multiplication	Depend totally on host cell for multiplication	Binary fission
ribosome	—	+
Cell wall	—	+
sensitivity to antibiotic	—	+
Growth in synthetic culture media	—	+

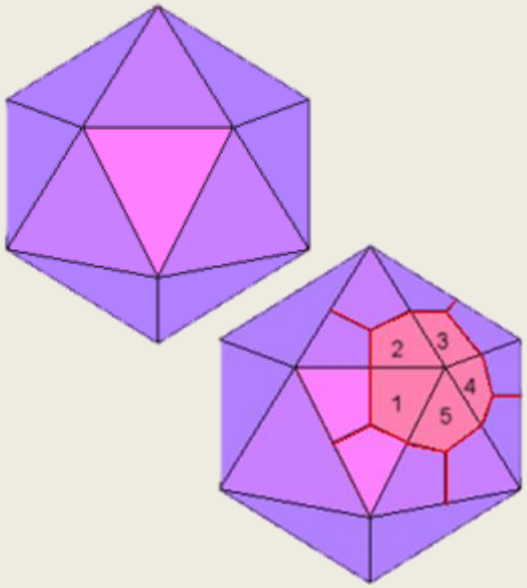
Virion Structure

- Nucleic acid, can be _____ or _____; never both.
- Nucleic acid surrounded by a protective protein coat, called a _____.
- An outer membranous layer, called an _____, made of lipid and protein, surrounds the capsid in some viruses.



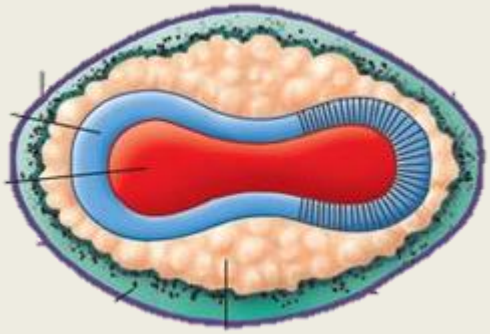
Types of symmetry of viruses

- ***There are three types of symmetry according to capsid shape:***



Icosahedral (cubic)

Adeno V.



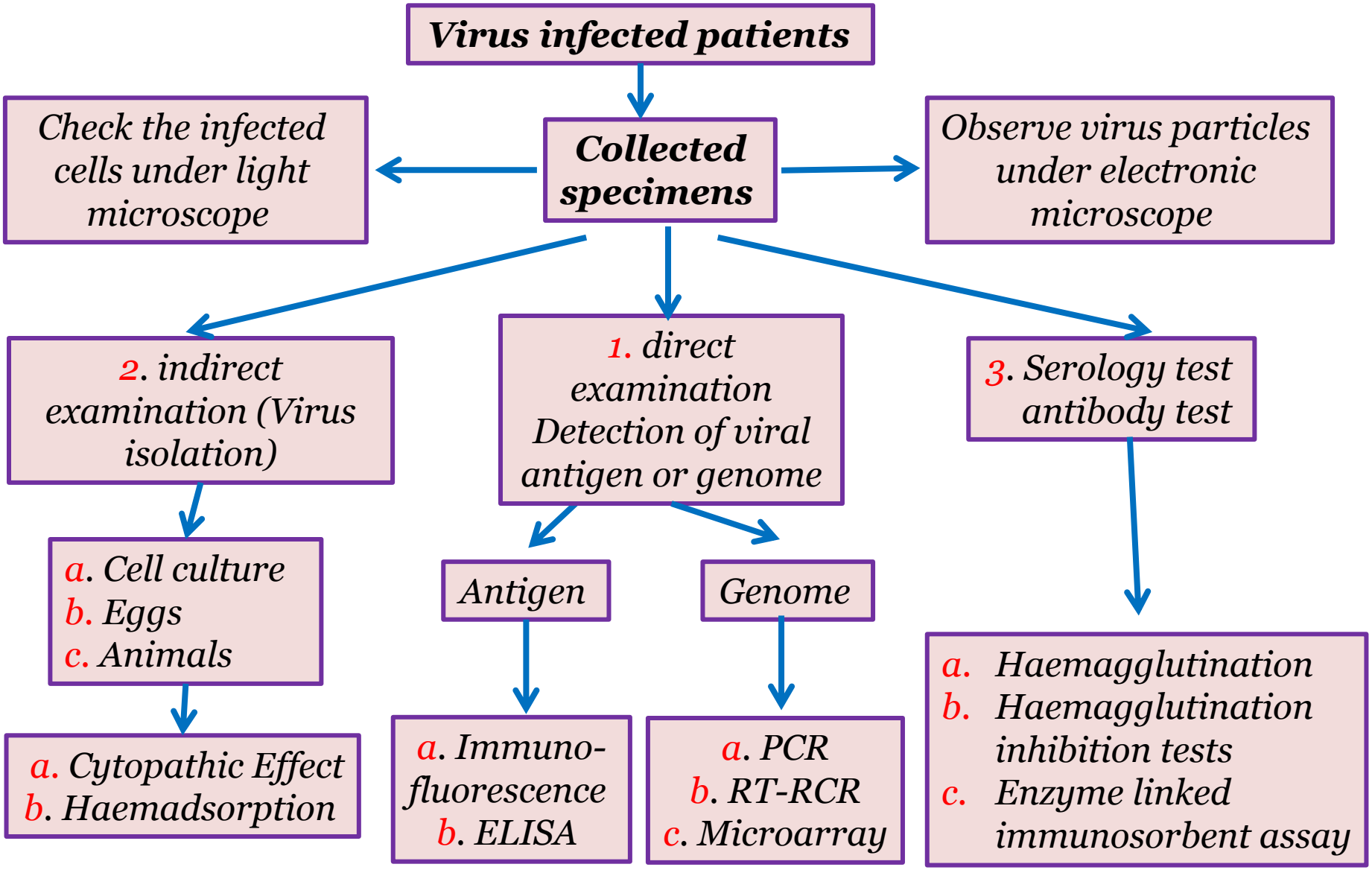
Complex

pox virus

Helical

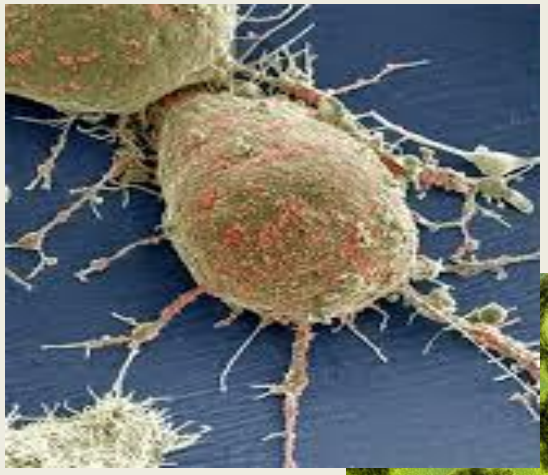
Influenza

Procedures for laboratory viral diagnosis

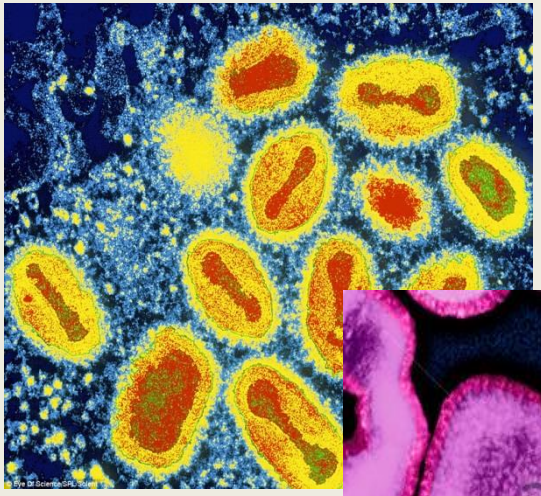


Examination of Specimen

- *virus particles*
  - ➢ *Electron Microscopy morphology*

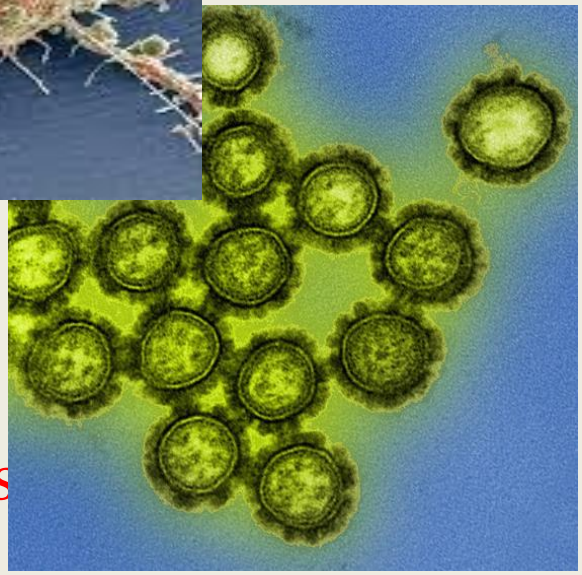


HIV



Pox virus

bb

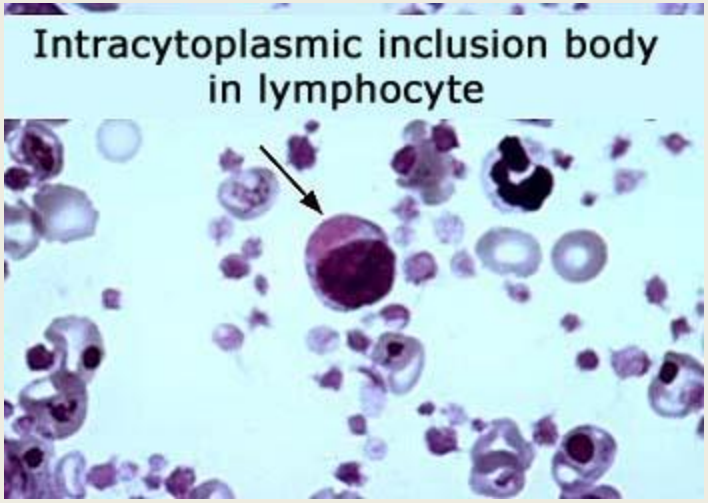


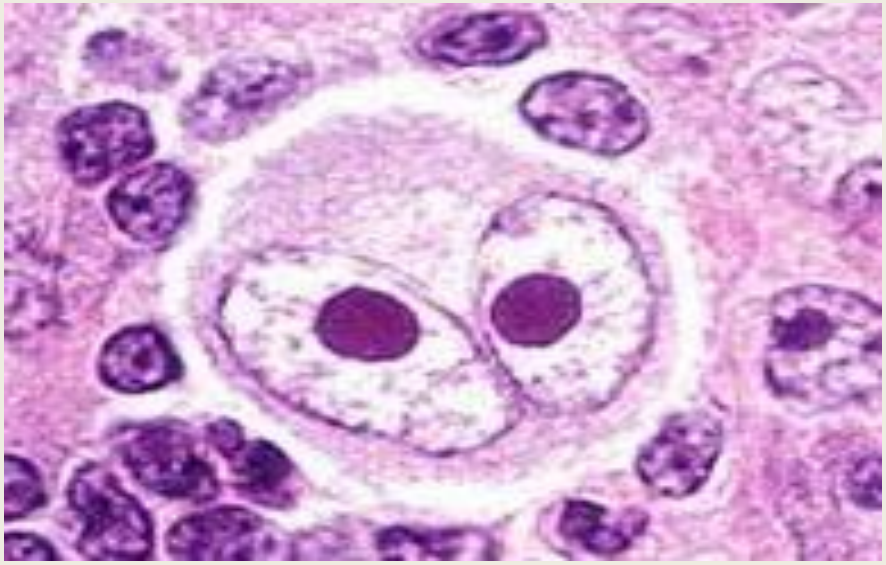
Adenovirus

Influenza viruses

Examination of Specimen

- *Infected cells*
  - *Light microscopy histological appearance - e.g. inclusion bodies*

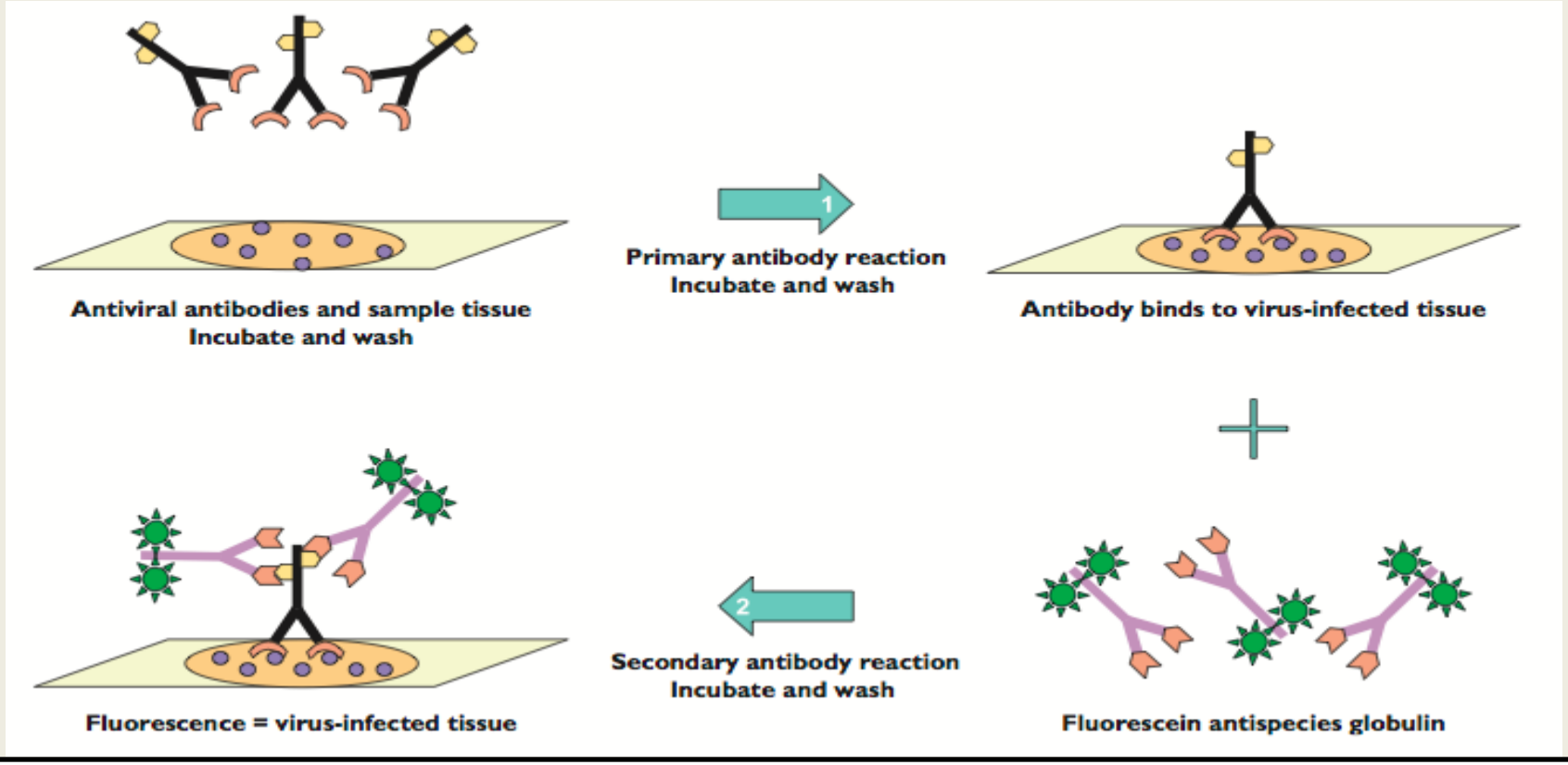




1. direct examination

a. Antigène détection

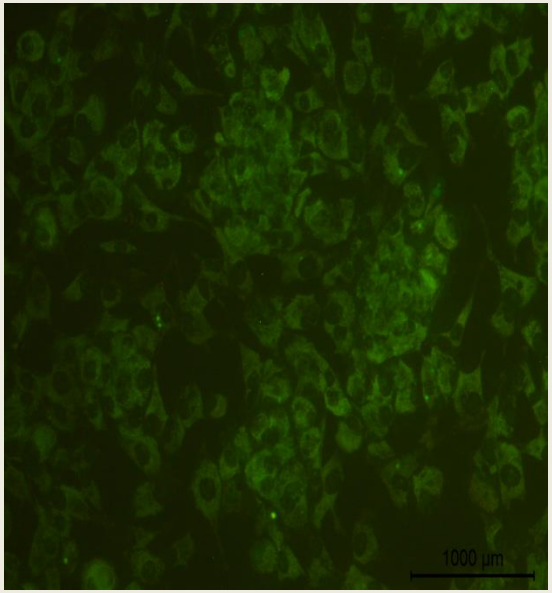
- *immunofluorescence, ELISA etc.*

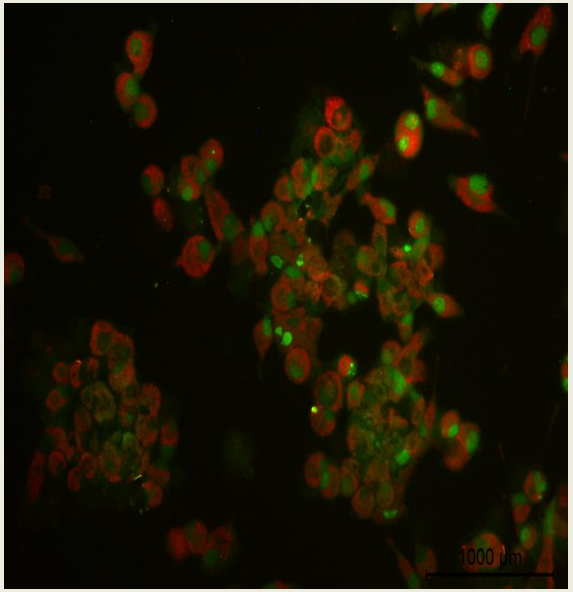


1. direct examination

a. Antigène détection

- *immunofluorescence microscopy.*

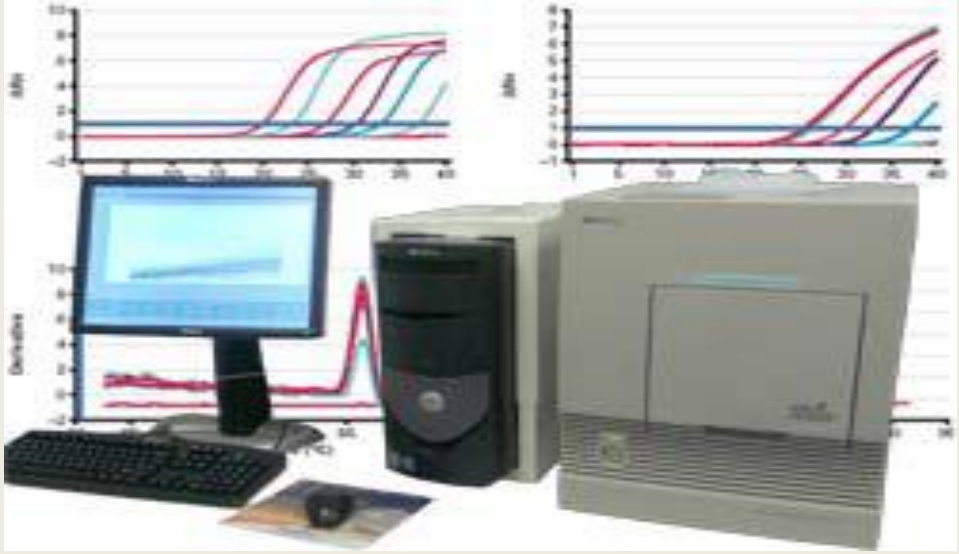




1. direct examination

b. Viral nucleic acids

- *Molecular techniques (PCR, RT-PCR) for the direct detection of viral genomes*



2. indirect examination
Virus isolation

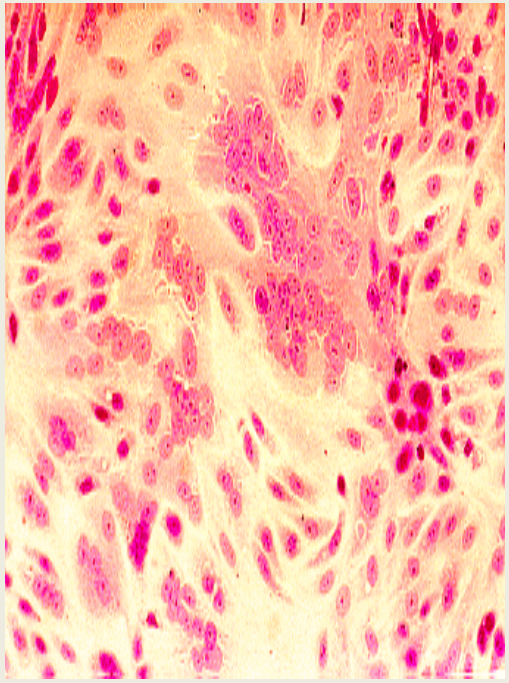
- *Since the viruses are obligate intracellular parasites, they cannot be grown on any ordinary culture medium.*
- *Viruses can be cultivated within suitable hosts, such as a living cell.*
- *Viruses not only need living cells to grow in but also they are specific about the type of cell they infect and grow in.*
- *There is no universal cell that will support all viruses*

2. indirect examination Virus isolation

a. Cell culture

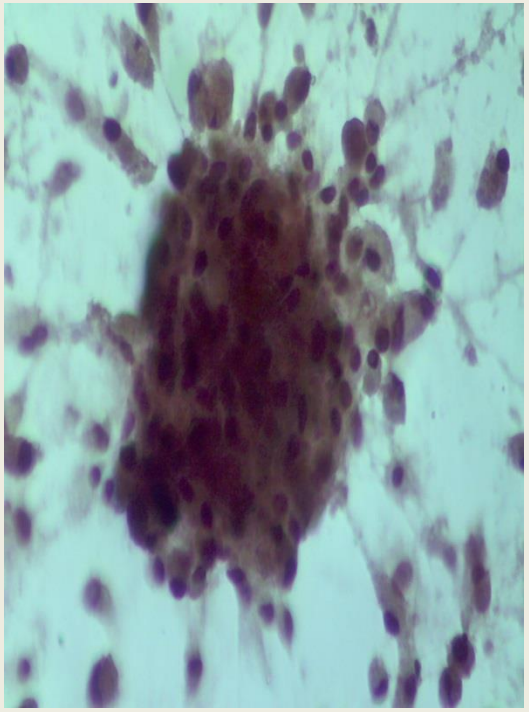
2. indirect examination Virus isolation

Cytopathic effect of viruses



Cell lyses

Adeno virus



Cell fusion

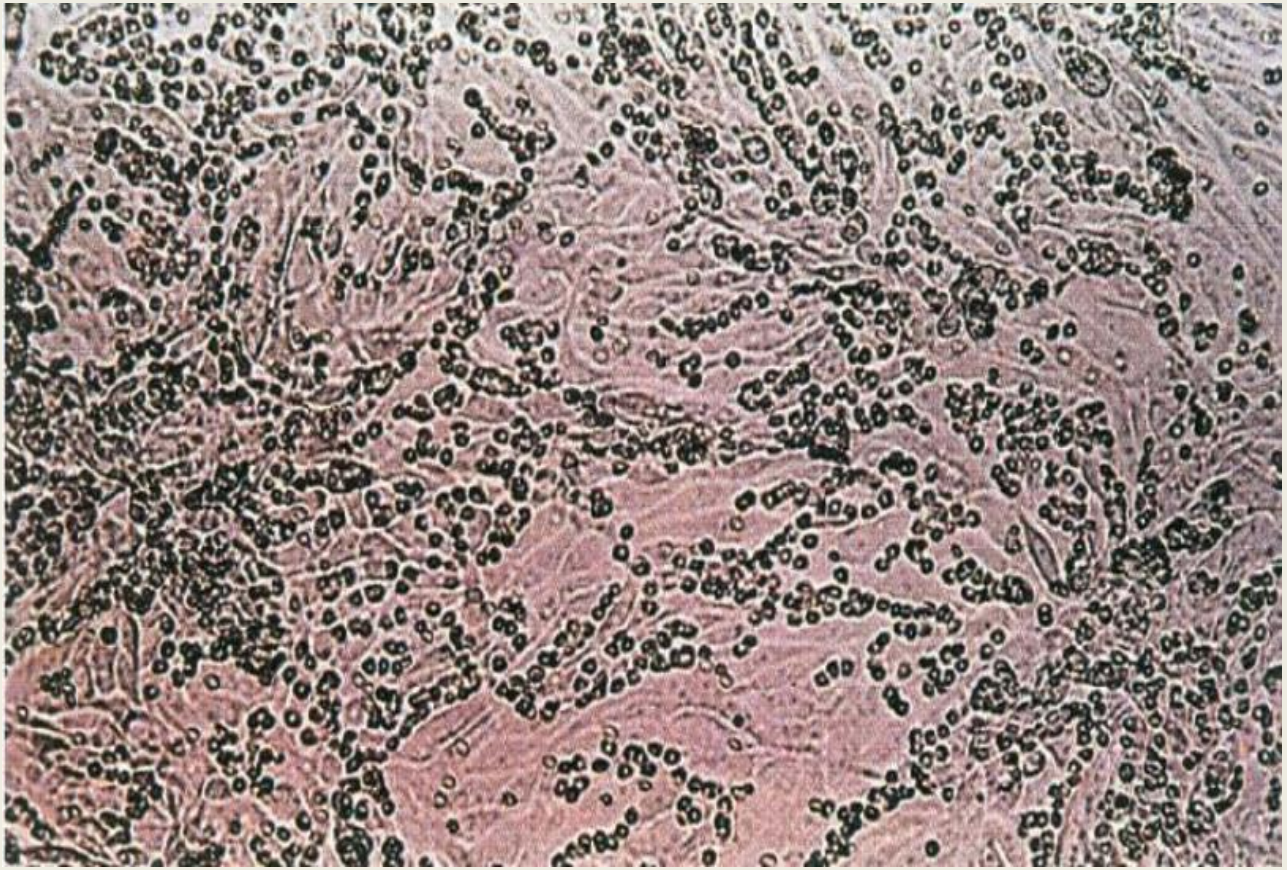
Formation of multinuclear giant cells (e.g. Measles)

Inclusion bodies

Papova virus
Reo virus

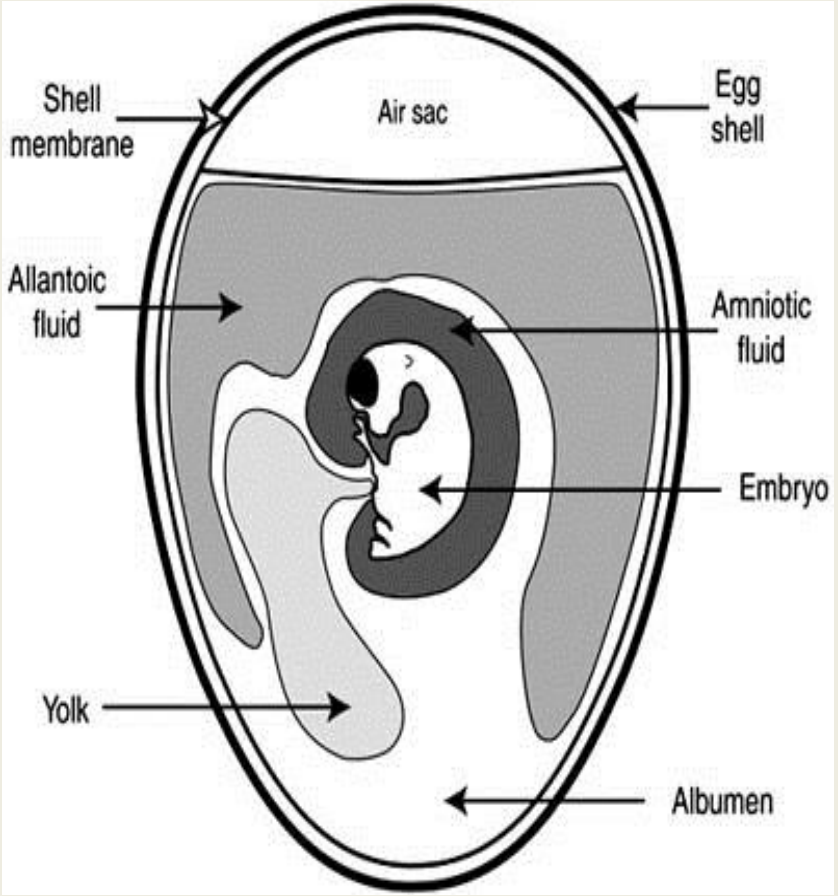
2. indirect examination Virus isolation

Hemadsorption of erythrocytes to infected cells



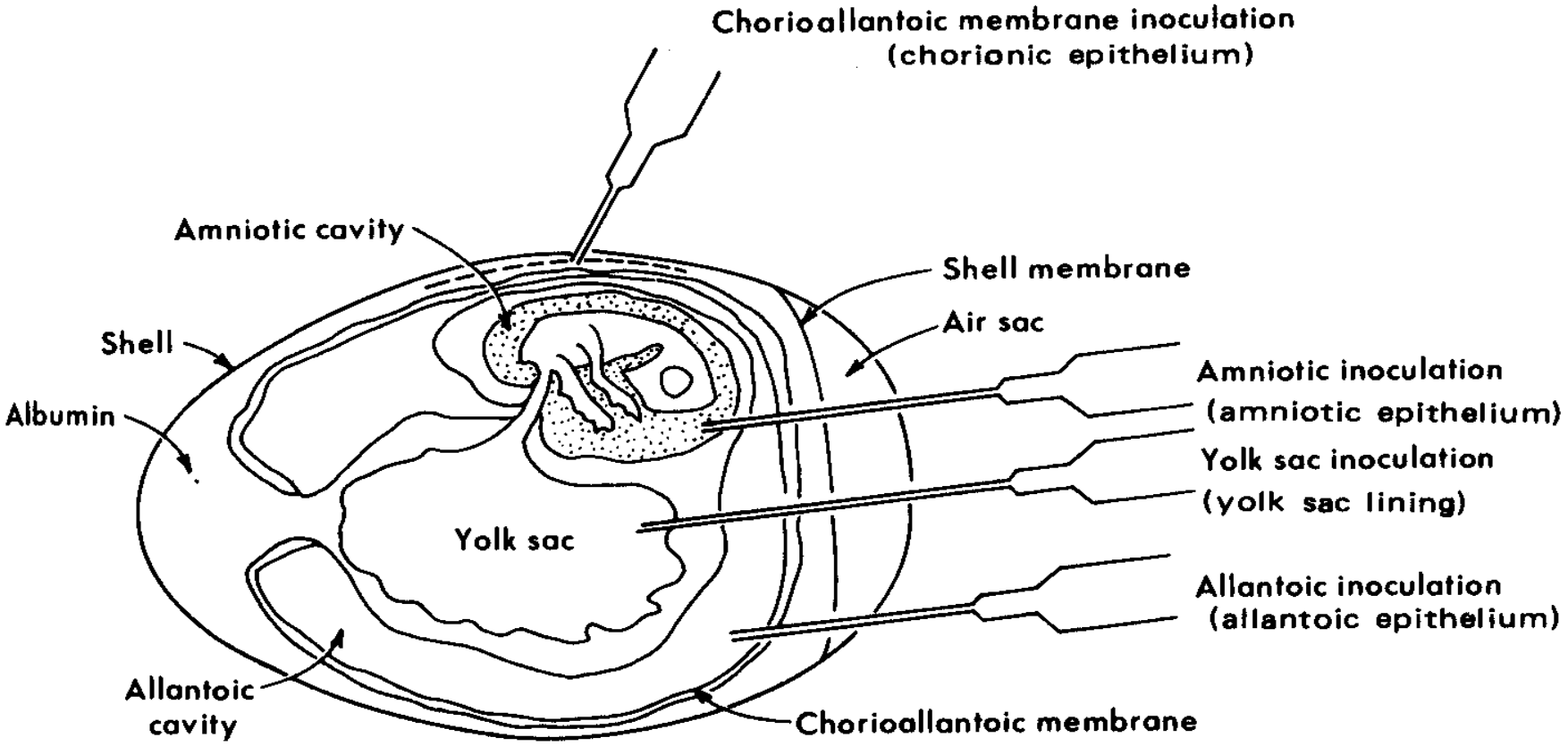
2. indirect examination Virus isolation

b. Embryonated Hen's Egg



2. indirect examination Virus isolation

Eggs Inoculation



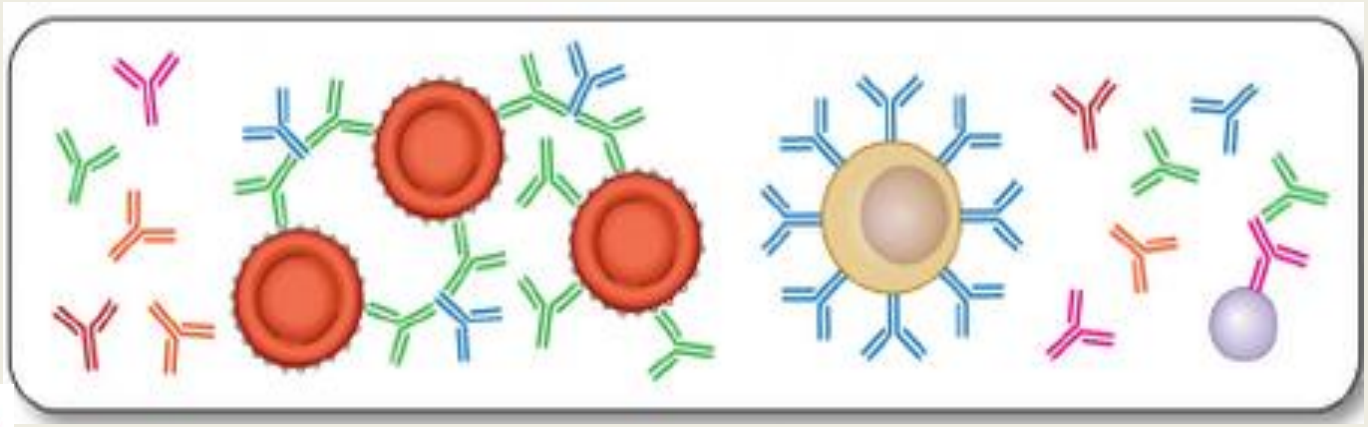
2. indirect examination Virus isolation

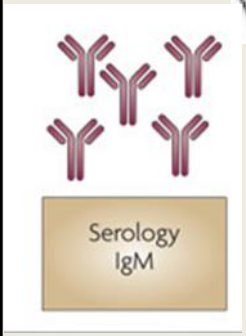
c. Animal Inoculation

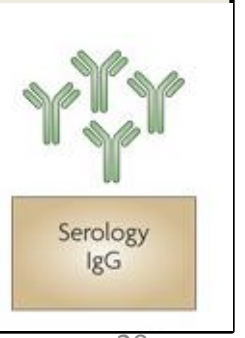
Viral replication can be detect by animal dead or animal disease

3. serology

- *Detection of rising titers of antibody between acute and convalescent stages of infection, or the detection of IgM in primary infection.*



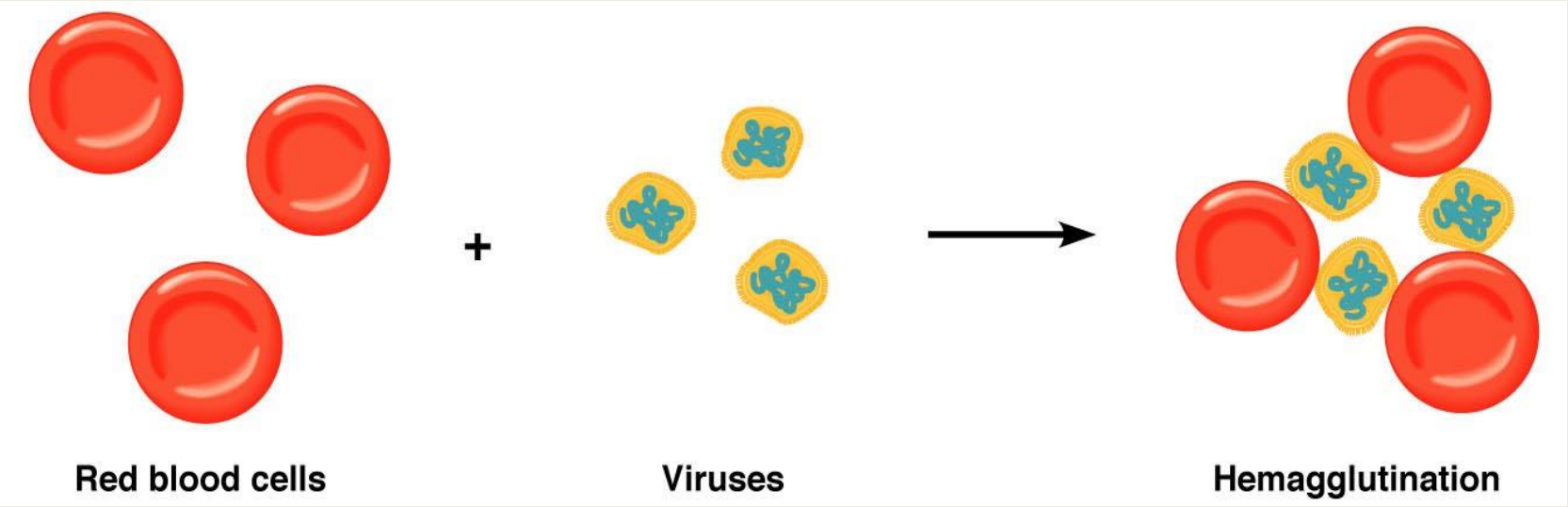




3. serology

a. Haemagglutination tests

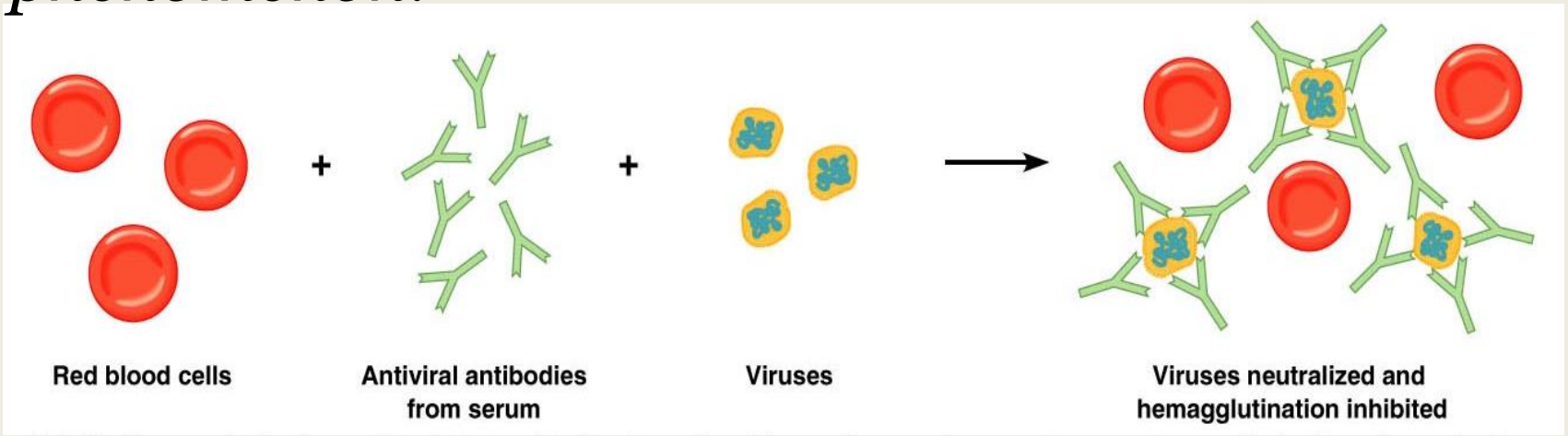
- *Principle: Some HA-bearing viruses agglutinate RBCs in vitro.*



3. serology

b. Haemagglutination inhibition tests

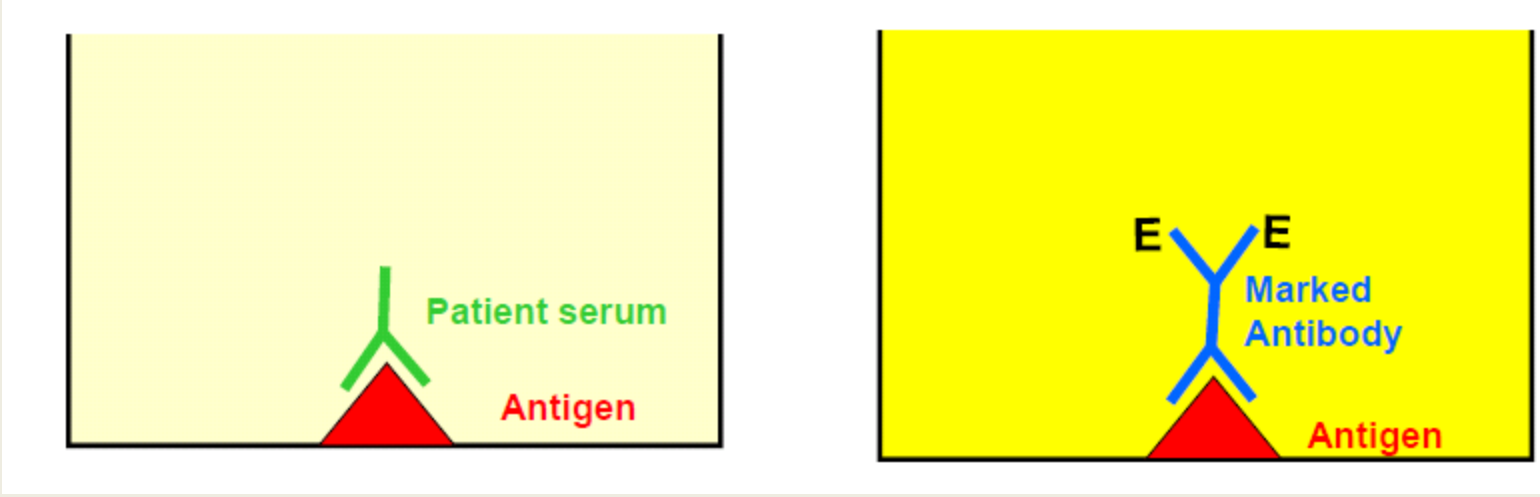
- *Principle: If a person is infected by HA-bearing virus, anti-HA Ab may appear in his serum. These antibodies can block Haemagglutination and lead to the Haemagglutination inhibition phenomenon.*



3. serology

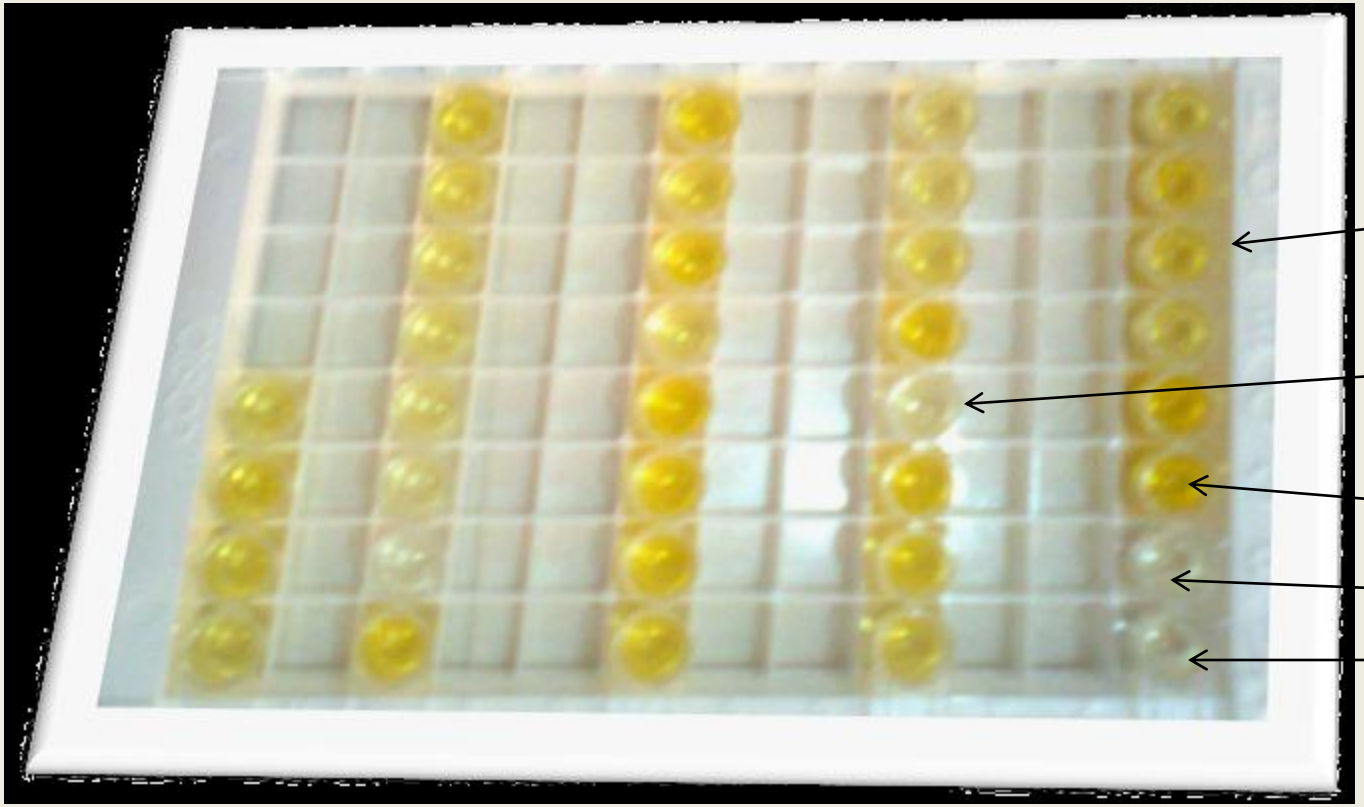
c. Enzyme linked immunosorbent assay

- *Enzyme reacts with substrate to produce colored product.*
- *Could detect viral antigens or antibodies against the virus.*



3. serology

Enzyme linked immunosorbent assay



questionary

- *Is there any virus which can infect the RBC ?*

Thank You For Listening