



Chapter 9

The Examination and Treatment of Microbes Infection



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Detection of pathogenicity bacteria

**Biological
detection**



**nucleic acid
detection**

**Immunological
detection**



Specimen: it is important
to correct detection.



collection ; transport





Section 2. The Examination of Bacterial Infection

I. Detection of pathogenic bacteria.

1. Obtain specimens:

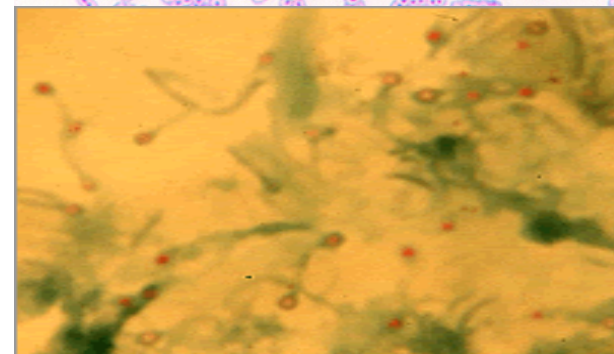
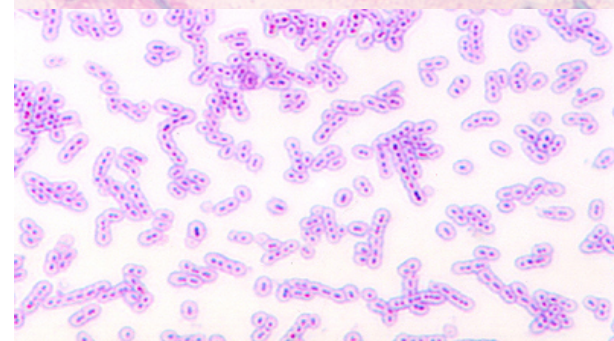
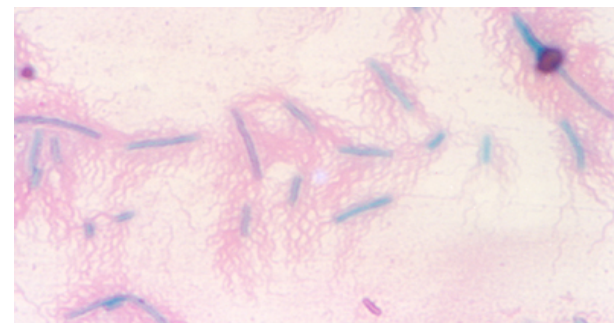
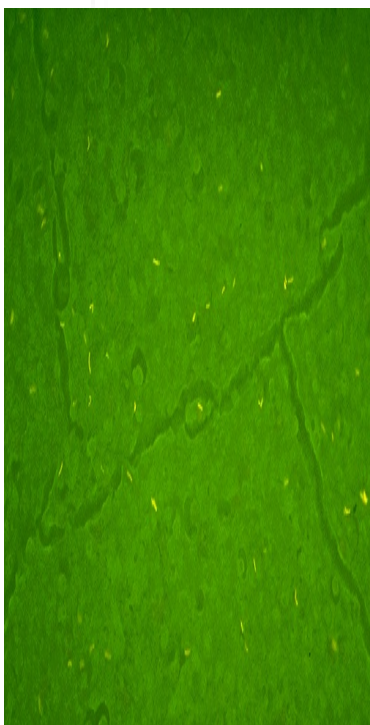
2. Microscopy and stains:

light microscopy

Gram stain, acid-fast stain

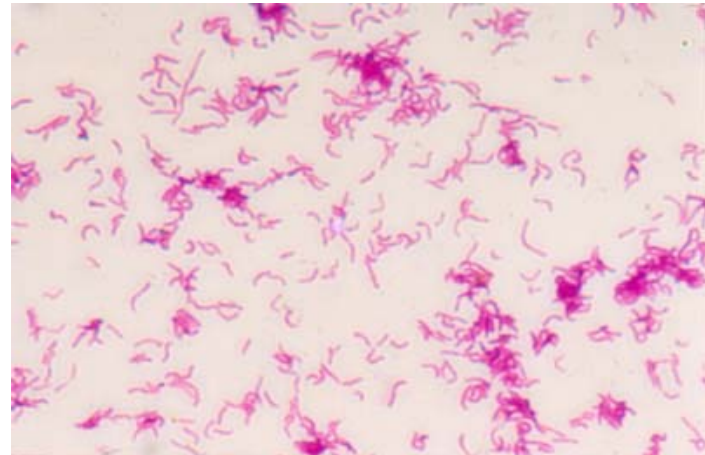


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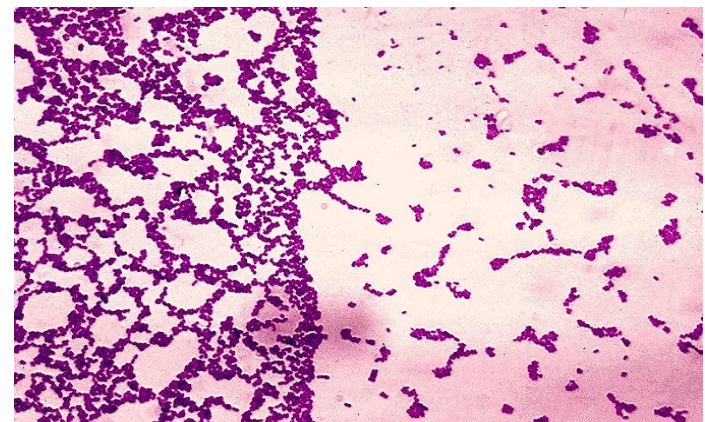
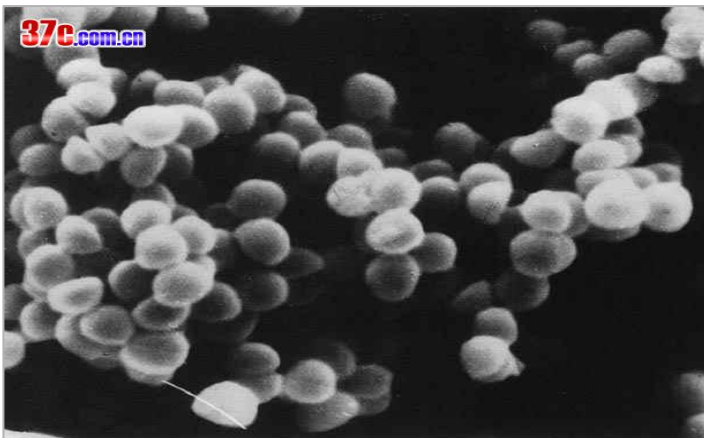




electron microscope



light microscope





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3. Isolation and identification:



Getting a pure culture

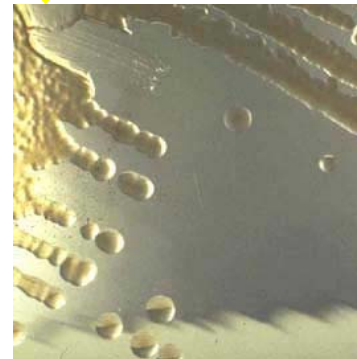
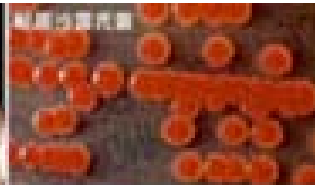
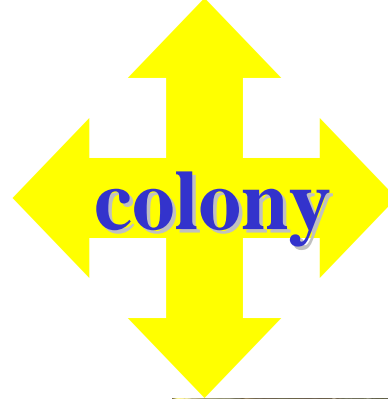
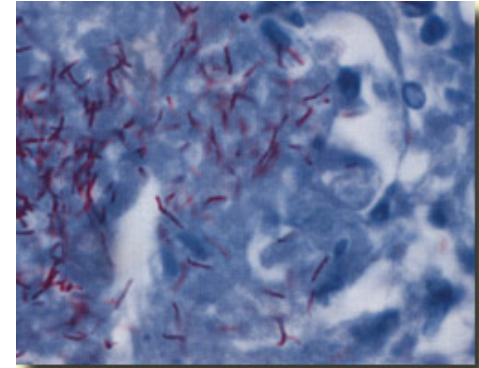
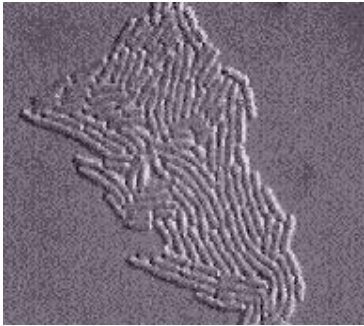


Identification :

- -- morphology
- -- culture
- -- biochemical reactions
- -- antibody-based tests
- -- animal experiments
- -- antibiotic susceptibility tests



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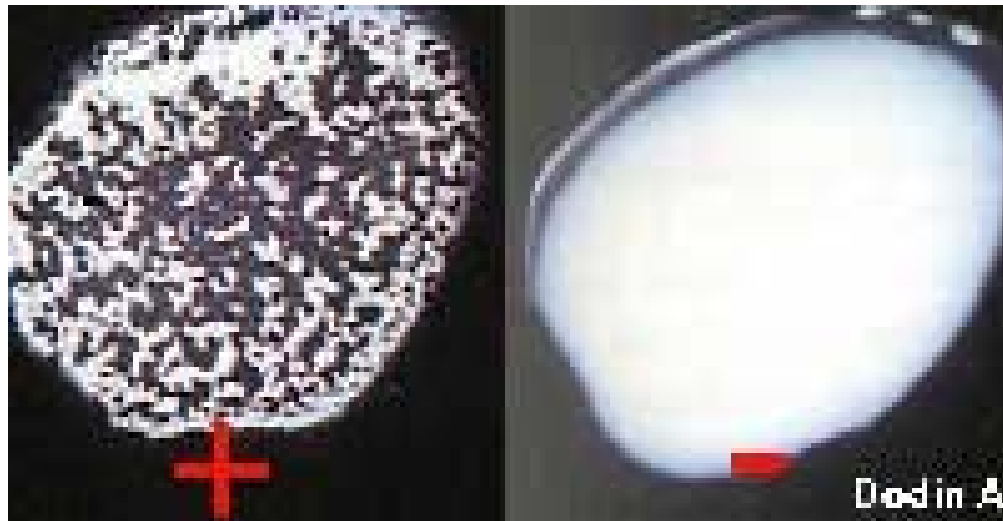




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- 4. Detection of bacterial antigens :
 - agglutination test,
 - ELISA, IFA , RIA
 - western blot
- 5. Detection of bacterial nucleic acids :
 - nucleic acids hybridization,
 - PCR , bio-chip(生物芯片)



Serolog test



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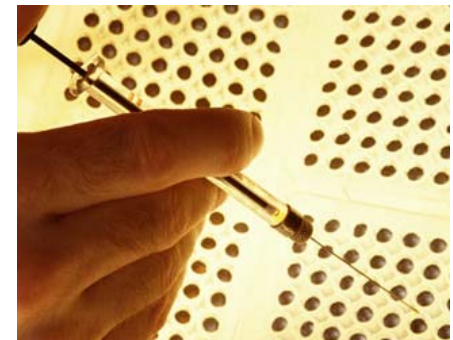
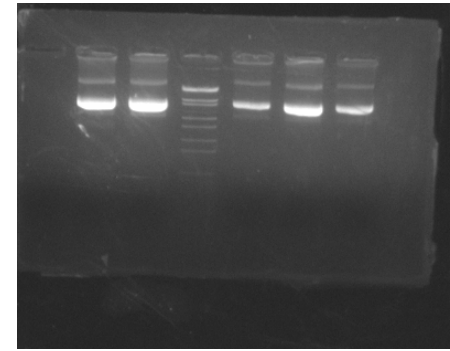


PCR → detect DNA

RT-PCR → detect RNA

Nucleic acid hybridization → detect DNA

biochip.....





II. Serologic tests:

To detect antibodies in the patient's serum(agglutination test , ELISA ---)



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Section 3. The Examination of Viral Infection

I. Isolation and identification of the virus:

Isolation:

- 1) animal injection(动物接种):
- 2) chicken embryo culture (鸡胚培养) :
- 3) cell culture (细胞培养) :

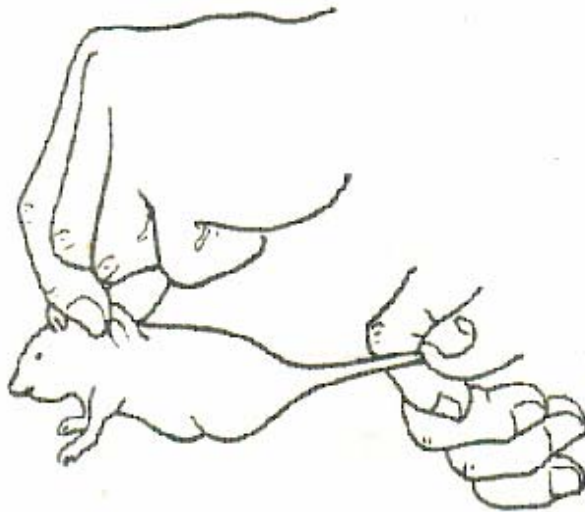


图 3—5 抓取小白鼠的方法

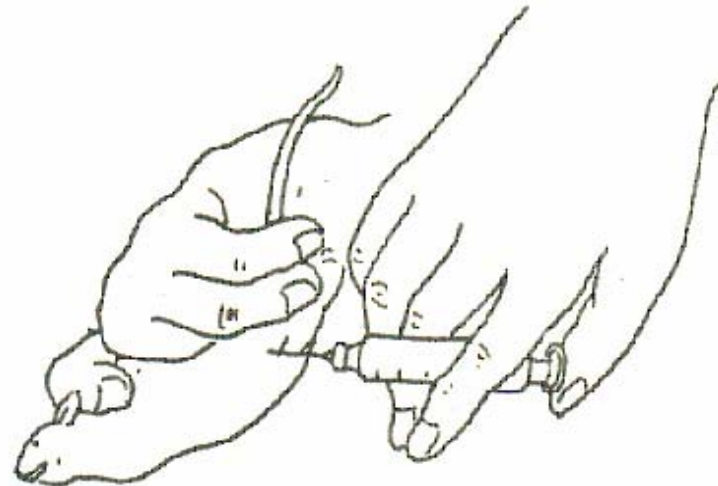
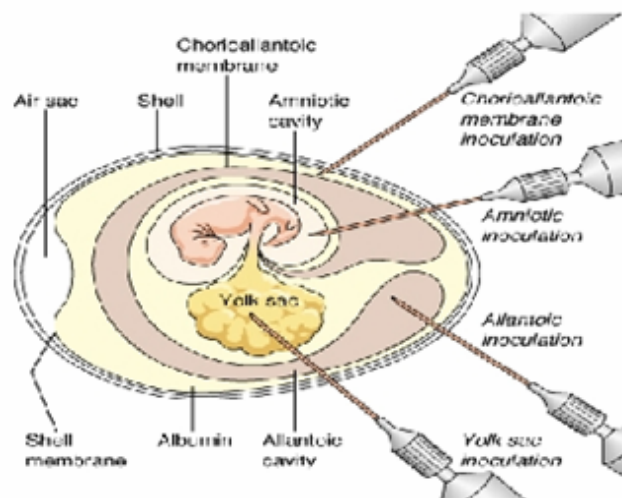


图 3—6 小白鼠腹腔注射法

Animal inoculation



Cultivation in embryonated egg



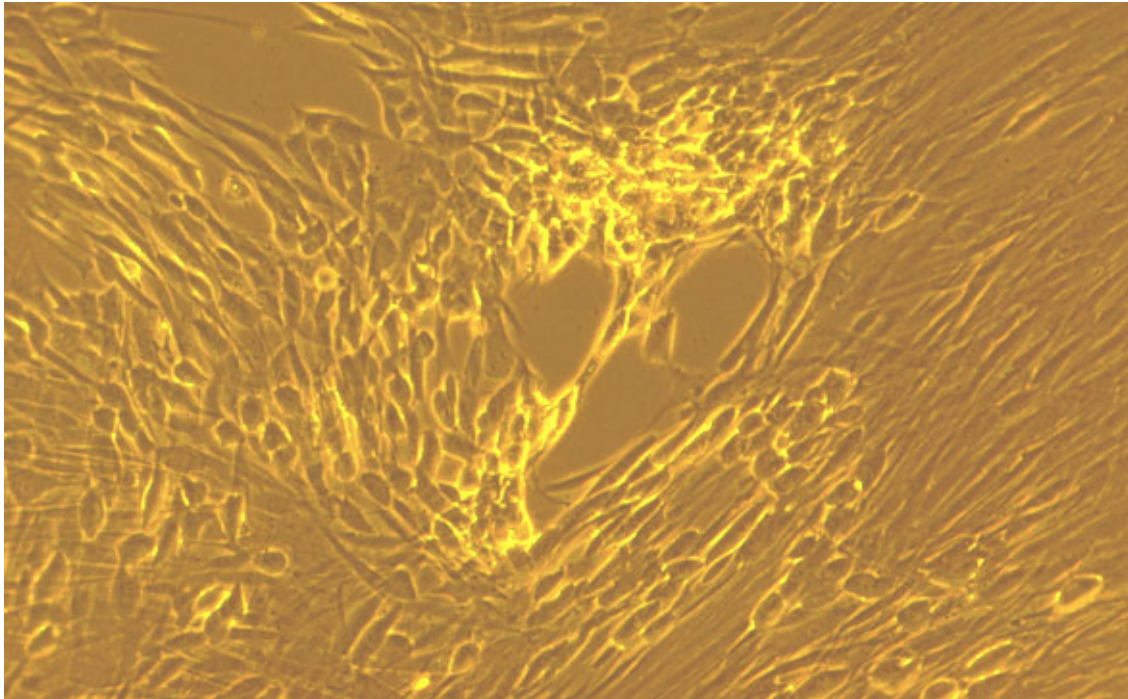
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- Virus injected into appropriate region
- Method widely used for production of vaccines

chicken embryo culture



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Cell culture



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Cell culture (细胞培养) :

primary (原代) cell culture:

diploid (二倍体) cell culture:

continuous (传代) cell culture:





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Identification:

Growth phenomenon of virus in cell culture:

1) Cytopathic effect (CPE) (细胞病变) :

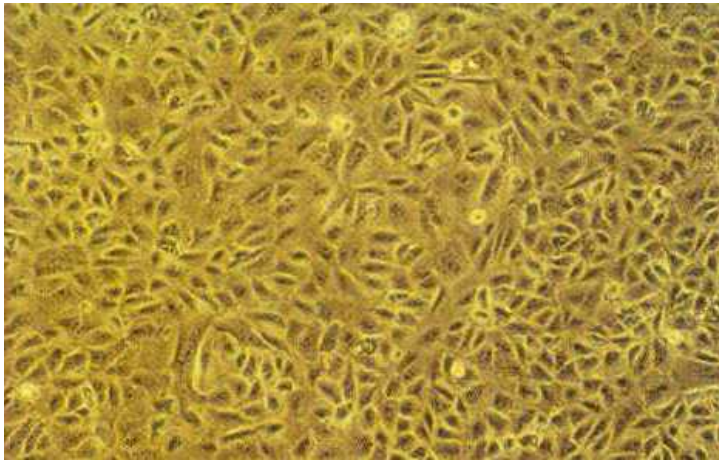
- -- The presence of the virus often gives rise to morphological changes in the host cell. Any detectable morphological changes in the host cell due to viral infection are known as a **cytopathic effect**.
- -- Cytopathic effects (CPE) may consist of cell rounding, disorientation, swelling or shrinking, death, detachment from the surface, etc.



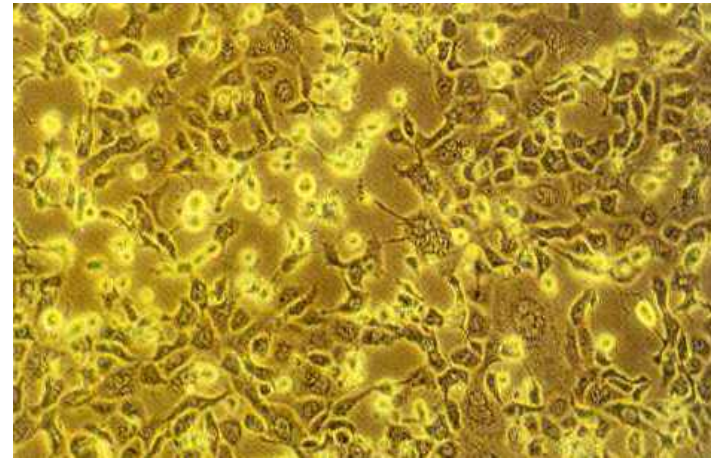
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Normal cell



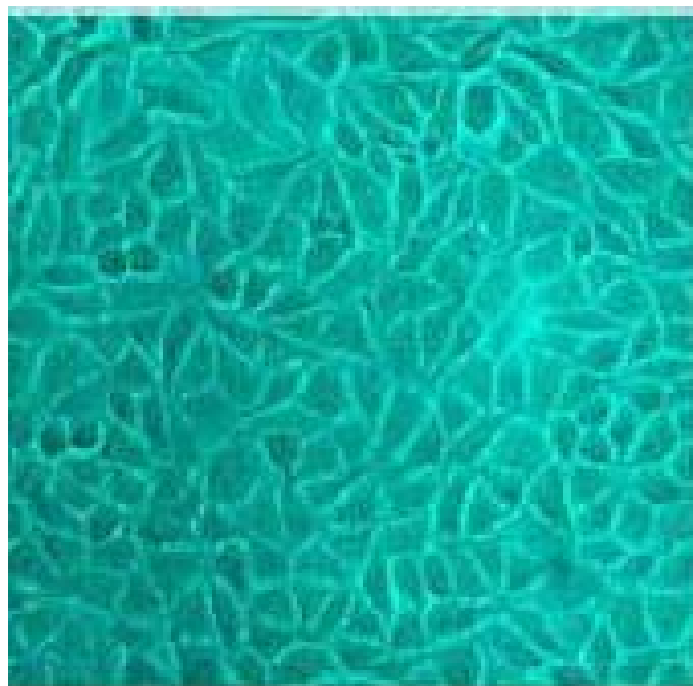
Lesion cell



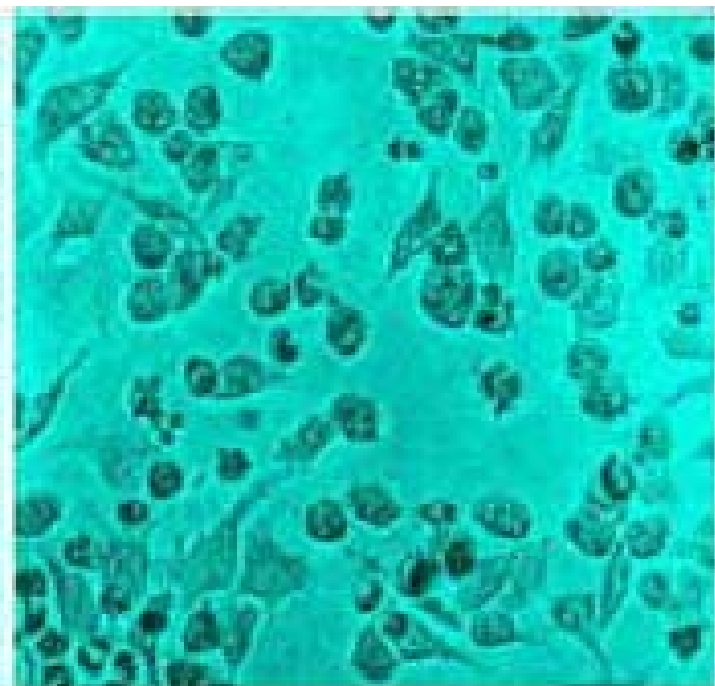
CPE



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正常细胞单层

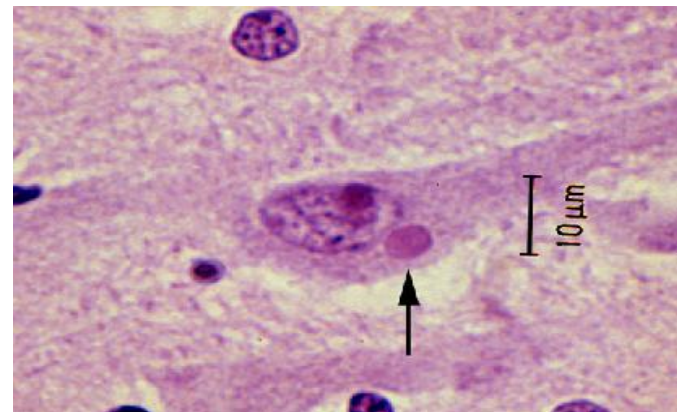


CPE现象



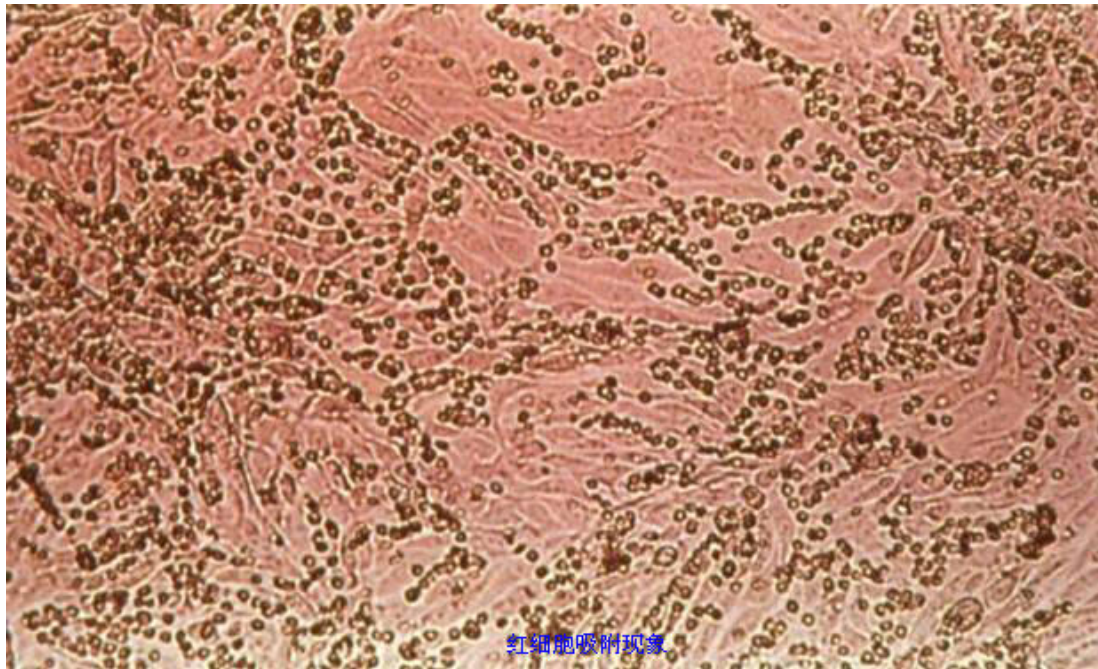
- 2) inclusion body
- -- round, oval, or irregular-shaped bodies occurring in the cytoplasm and nuclei of virus-infected cells, as in disease caused by virus infection such as rabies, smallpox, herpes, etc.

Rabies (Negri bodies)





- 3)hemadsorption: attachment of erythrocytes to the surface of virus(HA)-infected cells.



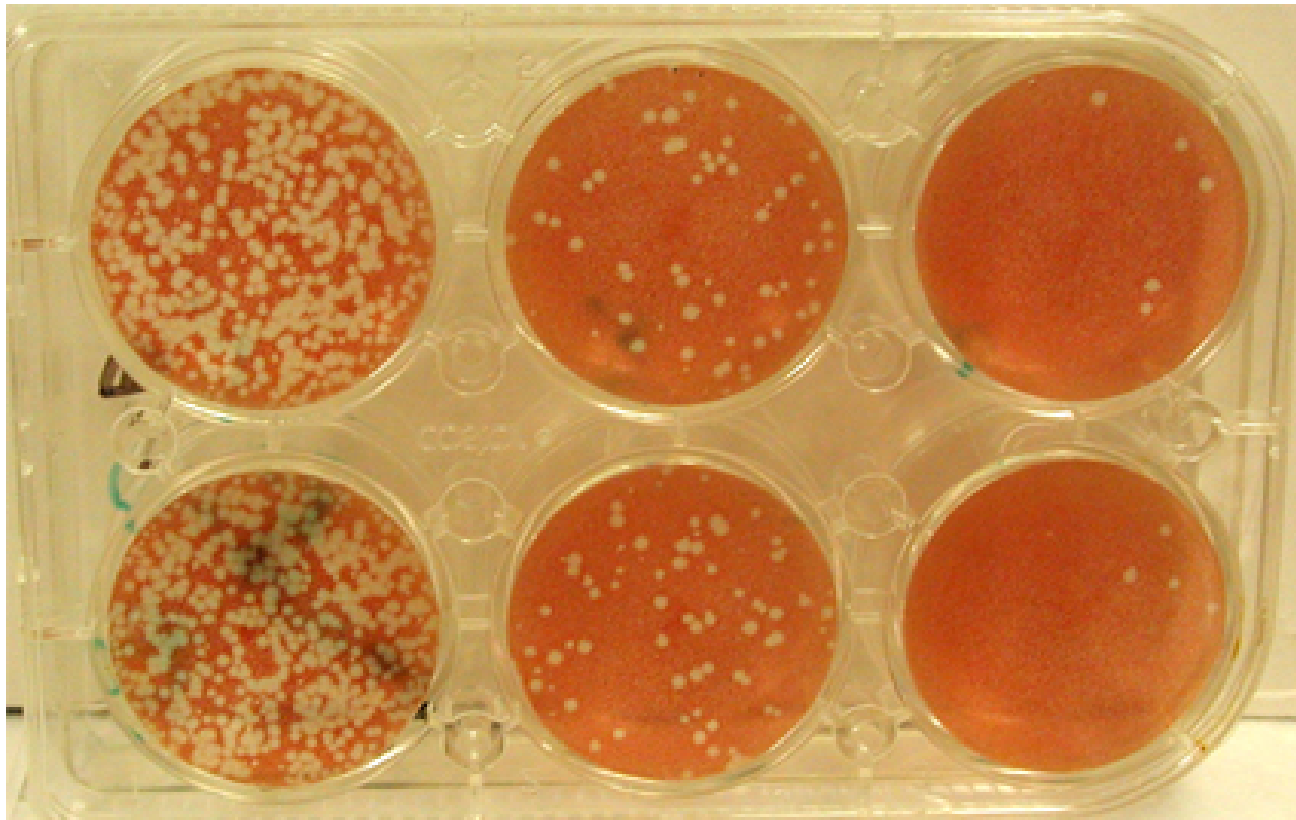
红细胞吸附现象



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- 4) plaque forming units (PFU) (空斑形成单位) :
- A plaque is produced when a virus particle infects a cell, replicates, and then kills that cell. Each plaque is the result of infection of one cell by one virus followed by replication and spreading of that virus. So we use PFU/ml to show virus' quantity.



plaque test



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II. Quick diagnosis:

1. **electron microscopy; light microscopy(CPE , inclusion body),**
2. **detection of viral antigen**
 - ELISA, immuno-fluorescence assay(IFA) , RIA
 - western blot
3. **detection of viral nucleic acid:**
 - PCR, RT-PCR, nucleic acids hybridization, gene chip
4. **detection of viral IgM**



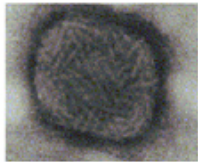
III. Serologic tests of viral infection

-- to detect viral antibodies in the patient's serum

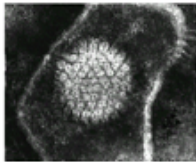
- 1). neutralizing test
- 2). hemagglutination inhibition test
- 3). complement fixation test
- 4). ELISA



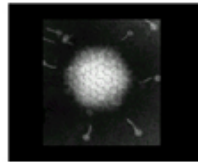
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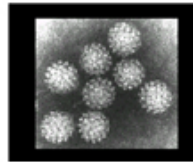
Poxviridae



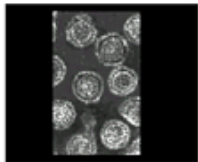
Herpesviridae



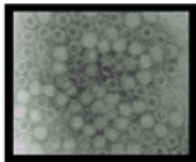
Adenoviridae



Papovaviridae
human papilloma



Hepadnaviridae



Parvoviridae

DNA Viruses

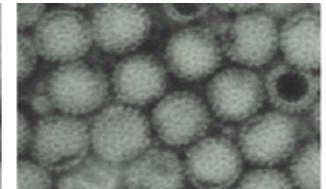
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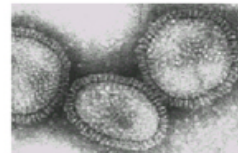
Paramyxoviridae (NS-)



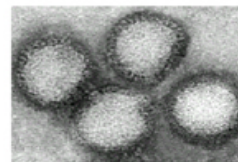
Rhabdoviridae (NS-)



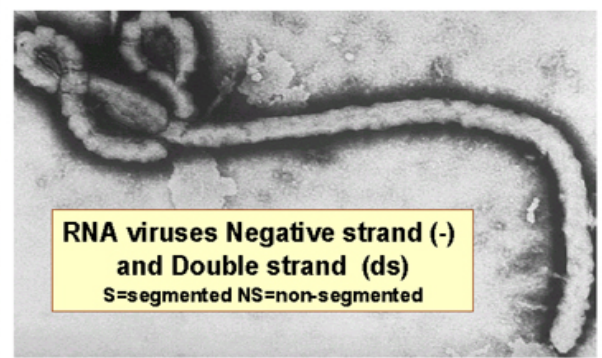
Reoviridae (S,ds)



Orthomyxoviridae (S-)



Bunyaviridae (S-)



RNA viruses Negative strand (-)
and Double strand (ds)
S=segmented NS=non-segmented

Filoviridae (NS-)

—
100nm