

## GENERAL VIROLOGY AND METHODS FOR DIAGNOSING VIRAL INFECTIONS

### INTRODUCTION

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Virology is a branch of microbiology that studies the structure, properties, reproduction, and pathogenicity of viruses. Viruses occupy a special place among infectious agents, as they represent non-cellular forms of life capable of reproducing only inside living cells. Understanding the structure, chemical composition, and mechanisms of viral replication is essential for the diagnosis, prevention, and treatment of viral infections.

Keywords: virology, viral morphology, replication, DNA, RNA, diagnosis, indication, PCR, viral infections.

#### Structure and Morphology of Viruses

Viruses consist of nucleic acid (DNA or RNA) and a protein coat — the capsid — which protects the genetic material. Some viruses possess an additional lipoprotein envelope (supercapsid) containing specific glycoproteins responsible for attachment to the host cell.

According to the shape of the capsid, viruses are classified as helical, icosahedral, complex, or spherical. The size of viral particles ranges from 20 to 300 nanometers, making them visible only under an electron microscope.

#### Chemical Composition and Viral Reproduction

The main components of viruses include nucleic acids, proteins, lipids, carbohydrates, and enzymes. The viral genome encodes the synthesis of proteins and enzymes necessary for replication.

Viral reproduction occurs in several stages:

1. Adsorption – attachment of the virus to the cell surface.
2. Penetration – entry of the viral genome into the cell.
3. Replication and protein synthesis – production of viral components.
4. Assembly of virions – formation of new viral particles.
5. Release from the cell – through cell lysis or budding.

Each stage of viral replication represents a potential target for antiviral therapy.

#### Methods of Virus Indication and Identification

Virus indication aims to detect the presence of a virus, while identification determines its type.

The main methods include:

Cytopathic effect (CPE) – visual changes in cultured cells.

Immunological methods – ELISA, immunofluorescence assay (IFA), and neutralization tests.

Molecular genetic methods – PCR and nucleic acid hybridization.

Electron microscopy – visualization of viral morphology.

#### Diagnosis of Viral Infections

Diagnosis of viral diseases is based on an integrated approach that includes:

Clinical examination (symptoms, incubation period, transmission routes);

Laboratory testing (detection of virus particles, antigens, antibodies, or nucleic acids);

Epidemiological data (infection sources, seasonality, and contact tracing).

Modern molecular methods such as PCR and rapid tests ensure high accuracy and speed of diagnosis.

#### Conclusions

Viruses are unique infectious agents characterized by a specific structure and intracellular mode of reproduction. Methods of indication and identification are crucial for laboratory diagnosis of viral infections. The development of molecular virology contributes to early detection, control, and prevention of viral diseases.