VIRUS PHYSIOLOGY, ADSORSION AND RECEPTORS

Ibragimova Lola Maxammadjanovna

Andijan State Medical Institute

Phthisiology and pulmonology, microbiology,

Senior Lecturer, Department of Virology and Immunology

Annotation: This article provides information on the physiology, adsorption and receptors of viruses, as well as the penetration of viruses into the cell.

Keywords: Virus, cytolytic form, adsorption, monocytes, tropism

Viruses are obligate intracellular parasites that only have the ability to reproduce intracellularly. In a cell infected with a virus, viruses can be in different states:

proliferation of many new virions;

the nucleic acid of the virus remains integrated with the cell chromosome (in the form of a provirus);

presence in the cell cytoplasm in the form of round nucleic acids resembling bacterial plasmids.

Therefore, the range of diseases caused by the virus is very wide: from a clearly effective infection that ends in cell death, to a long-lasting interaction of the virus with the cell in the form of latent infection or malignant transformation of the cell.

Differentiation is made up of three types of virus interactions: effective, unsuccessful, and integrative.

1. Type of production - ends with the formation of a new generation of virions and the death (lysis) (cytolytic form) of infected cells. Some viruses leave without destroying cells (nonsitolytic form).

The type of abortion does not end with the emergence of new virions, because the infectious process in the cell is stopped at one of the stages.

The type of integration, or virogeny, is characterized by the introduction (integration) of viral DNA into the cell chromosome in the form of a provirus and their co-existence (joint replication).

Reproduction of viruses (productive)

An effective type of interaction with the virus is ca with the cage, ie. Reproduction virus (lat. repetition, production - production), is carried out in 6 stages:

1) virions in the adsorption cell;

2) virus entering the cell;

3) “line” and viral genome extraction (viral deproteinization);

4) synthesizing components;

5) formation of virions;

6) release of virions from the cage.

These stages are different for different viruses.

Adsorption of viruses. The first stage of virus replication is adsorption, i.e. the adhesion of the virion to the cell surface. It is done in two stages. The first stage is not specific, due to other mechanisms, including ion attraction between the virus and the cell. The second stage of adsorption is very homogeneous, complementary to the receptors of sensitive cells, due to their "recognition" of protein ligands of viruses. Proteins that recognize certain cellular receptors on the surface of viruses and interact with them are called binding physical proteins (mainly glycoproteins). in) as part of the lipoprotein membrane.

Specific receptor cells have different nature, being proteins, lipids, proteins, lipids, carbohydrate components, etc. Thus, the receptors for influenza virus are glycoproteins and glycolipids (gangliosides) sialic acid in the cells of the respiratory tract. Rabies viruses are adsorbed on acetylcholine receptors in nerve tissue, while human immunodeficiency viruses are adsorbed on CO4 receptors on T-helpers, monocytes, and dendritic cells. A single cell contains tens to hundreds of thousands of specific receptors, so tens and hundreds of virions can be adsorbed on it.

The presence of specific receptors underlies the selectivity of the defeat of certain cells, tissues, and organs by viruses. This is called tropism (Greek. Tropos - turn, direction). For example, viruses that multiply mainly in liver cells are called

hepatotropic, in nerve cells - neurotropic, in immunocompetent cells - immunotropic, and so on.

The entry of viruses into the cell. Viruses enter the cell as a result of receptor-dependent endocytosis (viropexis) or the addition of a viral envelope to the cell membrane or a combination of these mechanisms.

1. Receptor-dependent endocytosis occurs as a result of capture and absorption of the virion by the cell: the virion enters the attached cell membrane and forms an intracellular vacuole (endosome) containing the virus. Due to the ATP-dependent “proton” pump, the endosome structure is acidified, which causes the lipoprotein envelope of the complex virus to bind to the endosomal membrane and the viral nucleocapsid to enter the cell cytosol. Endosomes combine with lysosomes to destroy the remaining viral components. The release of uncoated (simply formed) viruses from the endosome to the cytosol is still not well understood.

2. The fusion of the virion with the cell membrane is unique to some wrapped viruses (paramyxoviruses, retroviruses, herpesviruses), including fusion proteins. The viral synthesis protein has a point interaction with the lipids of the cell membrane, as a result of which the viral lipoprotein envelope binds to the cell membrane and the internal component of the virus enters the cytosol.

A) "Dressing" of viruses (deproteinization). As a result, its internal component is released, which can lead to an infectious process. The first stages of virus “undressing” begin when the virus enters the cell as a result of the fusion of the virus and cell membranes, or when the virus passes from the endosome to the cytosol. The next stages of “undressing” the virus are closely related to their transition to intracellular deproteinization sites. There are special "dressing" areas in the cell for different viruses: for picornaviruses - lysosomes in the cytoplasm, in the presence of the Golgi apparatus; for herpes viruses - perinuclear cavity or holes of the nuclear membrane; for adenoviruses - first the structure of the cytoplasm, then the cell nucleus. The end products of stripping can be nucleic acid, nucleoprotein (nucleocapsid), or virion nucleus. Thus, the end product of picarnovirus clearance is a nucleic acid that is covalently bound to one of the

internal proteins. And in many wrapped RNA viruses, the end products of stripping may be nucleocapsids or nuclei, which not only interfere with the expression of the viral genome, but also protect it from cellular proteases and regulate subsequent biosynthetic processes.

C) Synthesis of viral components. Synthesis of viral proteins and nucleic acids, which are not combined in time and space. The synthesis is carried out within different parts of the cell, so this method of replication of viruses is called association (lat. Disjunktus - combined).

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