INTERNATIONAL JOURNAL OF INTEGRATIVE AND MODERN MEDICINE

Coronavirus, Their Types, Biological Properties and Structural Features

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Abstract

The article presents historical information, general concepts, sources, transmission routes, types, biological properties, biochemical composition, receptors, pathogenesis of penetration into human cells, morphogenesis and pathomorphological changes of their invisible diseases

Keywords: *virus, coronavirus, source, RNK, receptor, pathogenesis, morphogenesis, pathomorphology*.

Coronaviruses are a large family of viruses that are common in many animal species, including camels, cattle, cats and bats. The acute respiratory disease caused by the novel coronavirus (SARS-COV-2) is called coronavirus disease 2019 or COVID-19. This virus was first discovered in 2019 in the city of Wuhan, Hubei Province (PRC), and as of March 2020, it entered the Republic of Uzbekistan and continues to spread.

Coronavirus is transmitted from living person to person by contact at a distance of less than 2 meters in the following ways:

- by airborne droplets (talking, coughing, sneezing), similar to the spread of influenza and other acute respiratory diseases;
- along the air-dust path (if there are dust particles in the air);
- by contact (shaking hands, holding household items, etc.).

The source of infection is a sick person, including during the latent (incubation) period of the disease (up to 2-14 days).

Clinical signs of a new coronavirus infection: fever, chills, cough, shortness of breath, heaviness in the chest, sneezing, weakness, runny nose (flu), sore throat and muscle pain. The likelihood of developing acute respiratory distress syndrome is high (1,2). Given these routes of transmission, avoid aerosolization procedures when COVID-19 is suspected (or confirmed) during autopsies of deceased individuals and, if aerosolization is likely, focus on measures to protect against this process, su ch as appropriate engineering controls when using an oscillating saw and the need to use personal protective equipment (PPE).

In addition, due to the risk of infection through injury, when handling biological material(s), standard precautions should be strictly followed to avoid direct contact with the biological material.

A virus (lat. poison) is a small particle that does not have a cellular structure, unlike microbes. They have different shapes: spherical, rod-shaped, cuboid, etc. (3, 4, 5). For example, the viruses that cause influenza, rubella and measles are round in shape. In subsequent years, star viruses were also

discovered. Because they are like particles, they cannot be seen with the naked eye. They cannot be seen even through microscopes in medical laboratories. They can only be seen with the help of an electron microscope, which can show sizes of at least thousands, 50-100 thousand, and with the help of specially processed preparations.Their size ranges from 20 nm to 350 nm. In fact, viruses are much smaller than germs. According to assumptions, viruses were formed millions of years ago from elements of human, animal or insect cells, and later turned into an autonomous system. Often the genetic and structural components resemble the cellular elements of a living organism (6, 7, 8).

Viruses reproduce inside the cells of all organisms (vertebrates, insects, plants). Cannot live outside living cells. It is noteworthy that viruses reproduce freely even inside fungi and bacteria and can cause damage to them. So, viruses are the smallest of all living particles and cannot live on their own. Because it does not have the ability to synthesize the necessary proteins, amino acids and enzymes. In fact, he receives all the products necessary for his life, that is, energy, at the expense of others. And thus, viruses are the smallest parasites in the world (the parasite lives at the expense of others).

A fully formed viral particle is called a virion. Its composition consists of an internal nucleic acid and an outer shell (capsid). It is worth noting that only one of the nucleic acids of viruses is DNA or RNA. According to these characteristics they are divided into groups.

In general, we can say that viruses are living protein particles with nucleic acid inside and a shell (capsid) outside. These particles always live in fear of entering a foreign cell. Otherwise it will die. Viruses easily pass through bacterial filters, while microbes, on the contrary, are retained. Viruses are found in the mucus of the mouth and nose when a person sneezes or coughs. They cannot pass through a rather thick gauze mask consisting of 4-5 layers. But if you wear the mask for 3-4 hours, the humidity will increase. At this time, the person experiences difficulty breathing (8, 9, 10). Once the mask is removed, viruses can remain alive until the mask dries.

The descendants of the coronavirus that threatens the entire world today are actually known to science as “human respiratory coronavirus” (HRCV). British and American scientists introduced them to science in the 60s of the last century. These viruses are incompatible with some characteristics of other viruses that cause acute respiratory infections. For example, the virus does not grow well in embryonic chicken eggs. But this virus grows well in tissue cultures (living cells) taken from the trachea and bronchi of human embryos. In fact, coronaviruses, like the human nose, throat, larynx and bronchi, especially the alveolar cells of the lungs, multiply in these places and cause severe diseases such as pneumonia (11, 12, 13). It is no longer a secret that viruses are transmitted to this area by airborne droplets.

When boiled, coronaviruses die instantly. It is not resistant to the external environment. But its durability is closely related to the external temperature. Stored for a long time at a temperature of minus 20 degrees. Resistant to solvents such as ether, alcohol, ethanol, ultraviolet rays, acidic and alkaline environments. So, you can easily use regular laundry soap. Sunlight also has a strong killing effect on viruses at high and dry temperatures. This is why coronavirus infections are seasonal. More precisely, it spreads quickly in the form of an epidemic, mainly in the autumn, winter and cool spring months. Human respiratory coronavirus infection dies in 10–12 minutes under the influence of ultraviolet rays (bacteriocytic lamps). But it should be said that the process depends on air humidity. Their mortality increases in dry heat by 25–35 degrees (14).

From these data it is clear that the disinfection work carried out, especially maintaining a distance of 1.5-2 meters between people and wearing a mask, reduces the infectious process among the general population. Quarantining the patient who is the source of the disease and his close contacts will prevent the spread of coronavirus. The question arises: how did coronavirus infection increase and

become a pandemic in the 21st century, when such technology, medicine and economic potential have reached their peak? The answer is simple: we have forgotten a little about infections, viruses and microbiology, especially epidemiology. We have come to understand migration as a simple situation. The result is known to all of us. To fight any disease, you need to know well what causes it. Currently, humanity is struggling with the most insidious invisible particles. Coronavirus is transmitted from person to person through airborne droplets, infecting its host. The trick is that the virus is transmitted by airborne droplets, and not through food. Can you hold your breath for 4 -5 minutes? Of course not. Although viruses are small, invisible particles, they remember for the rest of their lives where they were and in what organism they were. In terms of preserving genetic information (stored in RNA), there are no unique creatures equal to them in the world. There are even structural and control genes (operator genes, activator genes). We mentioned above that viruses are composed of proteins. Proteins themselves are made up of many amino acid chains. At the beginning there are "C"-amino acids, and at the end there is an "N"-amino group. Viruses must enter a human cell in order to divide and multiply. But human cells cannot break the chain of amino groups. Viruses require human cells to reproduce. Remember, the reproduction of coronaviruses is very different from the division of microbes. They reproduce in isolation. If you give microbes a simple nutrient medium, they will multiply freely. Coronaviruses reproduce in the cells of living organisms.

During this period, microbes divide a hundred times, viruses - a million times, and in 1-2 days - a billion times. Bacteria reproduce by dividing into two or three parts. But after coronaviruses enter the host cell, according to the encoded information, its components are synthesized separately. Note that the virus is first absorbed and enters the cell it wants to infect. The crowned spines help him in this. These spines act as sensory receptors. This is how coronaviruses search for sensitive cells. Under such difficult conditions, the outer shell of the virus and the membrane of the human cell stick to each other, and inside the cell, the coronavirus breaks away from the outer shell, that is, "undresses." This is how coronaviruses activate their parasitism. It has a cytopathogenic effect on cells and severely damages them. One viral particle divides 1000 times in one cycle, 10,000,000 times in 3 cycles. It should be said that the shell of coronaviruses has been "removed" and now it is filled with host cells due to proteins. As a result, damaged cells do not recognize it and completely lose their ability to resist. The viruses then leave the dead cells and move into new ones.

That is why in each country the disease is different, and the degree of damage is also different. Fighting this tiny and sneaky coronavirus requires a lot of fortitude and patience.

The bottom line is that unless we know the characteristics of these small toxic particles, they are very difficult to deal with. Viruses have no color or language. They attack mercilessly. But the source of the disease is known; it is transmitted to humans by airborne droplets.

Viral infectious diseases have always been one of the pressing problems of medicine. Billions of people on Earth are currently infected with one type of viral infection or another. According to experts from the World Health Organization (WHO), 80% of infectious diseases are viral.

Viruses (Latin Virus "poison") are non-cellular life forms that can reproduce only inside a cell.

Viruses are considered very small living organisms consisting of nucleic acid prot ein molecules, carriers of genetic information, surrounded by a protective shell. Their main feature is that they multiply like parasites in the cells of the affected organs. These viruses do not have their own apparatus for synthesizing organ molecules, so they use human and animal cells as a source for self-reproduction. In nature, many different viruses are known that parasitize bacteria, plants, animals and human cells. The reproduction of viruses in cells becomes more and more intense, causing damage to organs and even death. But the role of viruses in nature is not limited to this. They serve as an

important factor in the evolution of living organisms in the world. Viruses achieve this because of their ability to change the genetic information of the infected organism.

Once in a cell, the virus gets rid of its genetic information and absorbs it, changing the genetic code of the organism. Viruses also transfer genes or groups of genes between organisms.

Since viruses constantly circulate in nature, they change and mutate, resulting in new types of viruses appearing. Under the influence of natural selection, only the most resistant forms of viruses survive. A living organism can be infected by several viruses at the same time. In such cases, as a result of the interaction of viral genes, new recombinant forms appear.

Coronaviruses (lat. Coronaviridae) are a family of viruses that includes 40 types of RNA viruses, divided into two subtypes that infect humans and animals. The name is associated with the structure of the virus; its spiky shape resembles the "crown of the sun." The official name of the coronavirus is COVID-2019, where CO stands for coronavirus, VI stands for virus, and D stands for disease. The genome is represented by single-stranded (+) RNA. The nucleocapsid is surrounded by a protein membrane and a lipid-containing outer shell (E1-transmembrane and E2-peplomeric glycoproteins), which forms a crown-like appearance, hence the name of the family.

The disease is caused by RNA-containing coronaviruses measuring 80-220 nm. There are 4 different coronavirus antigens. The outer shell of the virus is covered with villi. Through these villi, the virus attaches to the cell (hence the name of this family of viruses - Coronoviridae). α and β coronaviruses multiply in the cytoplasm of the epithelium of the upper respiratory tract (later they cause respiratory diseases in humans and gastroenteritis in animals). This virus produces many virions 4 -6 hours after entering the epithelial cells of the respiratory tract, causes abortive damage to macrophages and dendritic cells (they do not produce new virions), and develops pro-inflammatory processes. Coronaviruses are resistant to the external environment. They are able to bind in their outer shell the complement contained in the patient's blood and hyperimmune serum.

The virus is adsorbed on the target cell using a glycoprotein (1), enters the cell through adhesion of the virus envelope and the cytoplasmic membrane of the cell or through an endocytosis receptor (2). Genomic RNA binds to ribosomes, and the RNA then serves to synthesize the full-length negative strand (4), which synthesizes RNA-associated RNA polymerase (3). During negative strand transcription, a positive strand with a new RNA genome (5) and a set of 5-7 RNA subgenomes (6) is synthesized. Each RNA subgenome is translated into a single protein (7). In the cell cytoplasm, the N protein binds to the RNA genome, resulting in the synthesis of a helical nucleocapsid (8). Glycoproteins S and M or E1, E2 move to the endoplasmic reticulum and Golgi apparatus (9,10). Nucleocapsids replicate within the endoplasmic reticulum membrane, which contains viral glycoproteins C and M. Virions migrate to the host cell membrane (10) and leave the cell by endocytosis (11).

Conclusion.

A virus (lat. poison) is a small particle that does not have a cellular structure, unlike microbes. They have different shapes: spherical, rod-shaped, cuboid, etc. They can only be seen using an electron microscope, which can show sizes of at least thousands, 50-100 thousand, and with the help of specially processed preparations. Their size ranges from 20 nm to 350 nm.

The generation of coronavirus is actually known to science as Human Respiratory Coronavirus (HRC). British and American scientists introduced them to science in the 60s of the last century. These viruses are incompatible with some characteristics of other viruses that cause acute respiratory infections. The coronavirus infects the alveolar cells of the nose, throat, larynx and bronchi, especially the lungs, and multiplies in these places, causing serious illnesses such as pneumonia.

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Reference

1. Al Hosani F et al. Clinicopathological, immunohistochemical and ultrastructural findings of a fatal case of moderate respiratory infection BVU coronavirus syndrome in the United Arab Emirates, April 2014. Am J Pathol 2016; 186: 652 - 8.
2. COVID-19: safe handling and processing for laboratories secondary COVID-19: safe handling and processing for laboratories, 2020. Public Health England
3. Iskandarov A.I., Khvan O.I., Yadgarova Sh.Sh. Forensic medical examination of corpses of persons suspected of coronavirus infection (COVID-19). Guidelines. Tashkent-2020
4. Clinical guidelines for the management of patients with severe acute respiratory infection when infection with a new coronavirus (2019-nCoV) is suspected. Interim recommendations 25 January 2020 WHO.
5. Centers for Disease Control and Prevention. (2020). Interim guidance for collection and submission of post-mortem specimens from deceased persons under investigation (PUI) for SARS-COV-2(COVID-19), February 2020. (по состоянию на 22 марта 2020 г.).
6. Centers for Disease Control and Prevention (USA). (2009). Post-mortem care and safe autopsy procedures for Novel H1N1 Influenza. (по состоянию на 22 марта 2020 г.).
7. Center for Disease Control and Prevention: National Vital Statistics System. Guidance for certifying deaths due to coronavirus disease 2019 (COVID-19). Accessed April 7, 2020.
8. World Health Organization. (2009). Natural ventilation for infection control in health care settings. World Health Organization. https://apps.who.int/iris/handle/10665/44167 (по состоянию на 22 марта 2020 г.).
9. World Health Organization. (2020). Water, sanitation, hygiene, and waste management for the SARS-COV-2(COVID-19) virus. Interim guidance: 19 March 2020. (по состоянию на 22 марта 2020 г.).
10. Center for Disease Control and Prevention: National Vital Statistics System. Guidance for certifying deaths due to coronavirus disease 2019 (COVID-19). Accessed April 7, 2020.