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VIRUS AND HUMANITY: ETERNAL CONFRONTATION

It's not a secret, that humanity is constantly struggling with something. Starvation in poor countries, fires, floods, tsunamis and still a lot of very dangerous things that happen every day. But there is something that has a larger scale, despite its small size. It's about viruses.

Scientists are still not sure whether viruses should be considered living things. These organisms, which are only a few nanometers in size, are a short string of nucleotides wrapped in a protein coat, where genetic information is encoded. They are much smaller than bacteria and cells, unable to independently produce the proteins that make up all life. Therefore, they do not actually live outside the cell. In nature, they can persist for a long time in an inactive state. But, once in a living organism, they multiply rapidly due to the resources of the host.

Most viruses are harmless to humans, because our immune system destroys them. However, some viruses multiply so quickly that they break down all defense mechanisms or set them up against the body, causing severe inflammation and fever.

Perhaps viruses are parts of DNA or RNA that have escaped from a multicellular organism. According to another hypothesis, viruses are older than a cell. This is why parts of the viral genome are embedded in the DNA of bacteria and animals in the form of “garbage”. It has also been suggested that the struggle between viruses and cells has served as a driver of evolution.

Viruses are very diverse in their structure and mechanism of action. In nature, there is not a single group of living organisms that would not be affected by viruses. Man is not exception.

Humanity has been struggling with epidemics since the beginning of history. And after each epidemic, the immunities of subsequent generations become more resistant to such diseases. But how many people passed away, no one will ever know. After all, the number of patients/dead/recovered can never be accurate.

Of course, each epidemic has its own character, symptoms, course of the disease (hard or light) etc. The most dangerous viruses that ruthlessly destroyed human organisms are plague, smallpox, cholera, Ebola, “Swine Flu”, AIDS and coronaviruses.

Plague (or plague disease) is an infectious disease caused by the bacteria of the plague bacillus (Latin *Yersinia Pestis*; discovered in 1894), found on small animals (rodents) and on the parasites that live on them – fleas. It is transmitted to a person through the bite of an infected flea, through direct contact with infected materials or by airborne droplets from the diseased. The incubation period is 3-7 days, then the symptoms typical for influenza develop: sudden fever, chills, headache and body aches, as well as weakness, nausea and vomiting. There are three forms of plague. In the bubonic – the most common form – the plague bacillus affects the lymphatic system. As a result, the lymph node becomes hard, a bubo appears on the body. In the late stage of the disease, inflamed lymph nodes turn into festering wounds.

Smallpox is caused by the variola virus (lat. *Variola*). It is transmitted by airborne droplets, as well as through objects with which an infected person came into contact. The incubation period is 7-17 days. The disease begins with a sharp increase in temperature, headache, often nausea and vomiting. After 2-3 days, the temperature drops, a nodular-rash rash appears on the skin and mucous membranes, leaving behind scars (smallpox). In 30% of cases, a fatal outcome is observed, with rare forms (confluent, hemorrhagic, purple), mortality reaches 70% and higher.

It was possible to cope with the disease thanks to the WHO global vaccination program, implemented since the second half of the 1960s. The last human case of

smallpox was recorded on October 26, 1977 in Somalia. The victory over the disease was officially announced in 1980.

Cholera is an acute intestinal infection caused by bacteria of the species *Vibrio cholerae*, characterized by damage to the gastrointestinal tract, impaired water-salt metabolism, and dehydration. It spreads through contaminated water and food, and is closely linked to poor sanitation and a lack of clean drinking water. Cholera is known from ancient times until the middle of the 20th century and remained one of the most dangerous epidemic diseases. In the XIX century cholera has spread from its original reservoir in the Ganges River Delta in India around the world. Currently, isolated cases and outbreaks of the disease occur in developing and poor countries, especially during massive natural disasters.

Acquired Immunodeficiency Syndrome (AIDS) is a disease that develops when a person is infected with the human immunodeficiency virus (HIV). The virus infects the immune system and weakens the body's defense against infections and diseases. HIV can be transmitted through sexual contact, transfusion of contaminated blood, the use of contaminated needles or sharp instruments, and also from mother to baby during pregnancy, childbirth and breastfeeding. AIDS can develop 2-15 years after infection. There is no cure for HIV infection. However, thanks to treatment with antiretroviral drugs, the virus can be controlled, its transmission prevented and the destructive effect on the body can be weakened.

Some scientists believe that HIV was transmitted from monkeys to humans back in the 1920s. According to the Joint United Nations Program on HIV/AIDS, in 2018 there were about 37.9 million HIV-infected people in the world, of which 1.7 million were children under the age of 15. The most unfavorable region is the countries of East and South Africa, where about 20.6 million infected live. The number of new HIV infections has decreased by 40% compared with 1997, when this indicator peaked, from 2.9 million to 1.7 million.

Coronaviruses are varieties of viruses that belong to the Coronavirinae subfamily of the Coronaviridae family (Nidovirales order). They were first discovered in the 1960s, causing gastrointestinal and respiratory infections in both humans and animals. There are 39 coronaviruses, including those of the Severe Acute Respiratory Syndrome and the Middle East Respiratory Syndrome.

Severe Acute Respiratory Syndrome (SARS), also known as SARS, is an acute infectious respiratory disease that is characterized by a transient development and a probability of death of about 10%. The incubation period (the interval between infection and onset of symptoms) is usually up to 10 days. The disease begins with fever (more than 38 degrees Celsius), the appearance of fever, chills, headache and muscle pain. After 3-7 days, the phase of deterioration of the respiratory system begins. The disease spreads by airborne droplets and by contact and household.

The SARS outbreak was first reported in November 2002 in the southern China province of Guangdong. Subsequently, numerous cases were reported in China, Vietnam, New Zealand, Indonesia, Thailand and the Philippines. In addition to Asian countries, SARS has been reported in North America and Europe. According to WHO, during the epidemic in 2002-2003, the total number of cases in 37 countries of the world reached 8 thousand 437 people, of which more than 800 died.

Middle East Respiratory Syndrome (MERS) was identified in 2012 in Saudi Arabia, from where it spread to other countries in the Middle East. According to one version of the WHO, camels were carriers of the virus. Manifestations of MERS are similar to the usual flu: fever, cough, shortness of breath, general malaise, diarrhea. The incubation period is 7-14 days. It is rarely transmitted to children (according to statistics, children under 14 make up 3% of all cases). In total, since September 2012, according to WHO, more than 1.3 thousand laboratory-confirmed cases of infection have been recorded, including more than 460 with fatal outcome. Plasma treatment is used for patients who have successfully suffered coronavirus infection.

Of course, no one is immune from diseases but all over the world well-known rules accepted to protect ourselves from illnesses.

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