

Mechanism and ways of transmission and source of appearance of coronavirus strains

Abstract

The mechanism of transmission of infection is a way of moving an infectious agent from an infected organism to a susceptible one. Each infectious disease has its own characteristic pathway of pathogen transmission, which was formed during evolution to preserve the pathogen as a species. The mechanism of pathogen transmission includes three phases: excretion of the pathogen from the host organism into the environment, presence of the pathogen in the environment, introduction of the pathogen into a new susceptible organism. The main mechanism for transmitting coronavirus infection is air-droplet (or air-dust), in which the pathogens are localized in the mucous membrane of the respiratory tract and transferred to the new body through the air. In this transmission path, the pathogen enters the external environment during sneezing and coughing with liquid drops and is introduced into the human body when inhaling air containing infected particles. If the particles are small, they are for some time in the air in the form of an aerosol (drops suspended in the air), and if the particles are larger, then they settle on various surfaces at a distance of up to two meters around the sick person. Very often these are frequent items: door handles, handrails in transport, mobile phones, etc. Touching his face, a person puts the virus on the mucous membranes of the nose, mouth, eye.

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Being coronavirus in the environment

Finding the virus in the air

In an experiment conducted by biologists, it was found that a coronavirus can remain in the air for three hours. The results of other studies suggest that in most real-world situations, the coronavirus is in the air for up to 30 minutes before settling on any surface.

Finding the virus on different surfaces

Large studies that have been conducted since previous outbreaks of coronavirus infection have shown that on steel surfaces, some of the coronaviruses can persist for up to 4 days even at 40°C. On paper, at room temperature, the coronavirus can be preserved for 4-5 days, on glass surfaces for 4 days, on plastic for 6 days.

Incubation period

The incubation period is the period of time from the moment the causative agent is introduced into the body to the appearance of the first clinical symptoms of the disease. For COVID-19 (based on the data obtained), the incubation period is from 2 to 14 days, on average for most patients - 5.2 days. The duration of the incubation period depends on a number of factors:

- I. Type of microorganism,
- II. Infecting dose (the minimum amount of pathogen that can cause disease),
- III. Virulence (degrees of the virus's ability to infect the body),
- IV. Ways to enter the body,
- V. From the state of the body in which the virus is introduced.

During the incubation period, the coronavirus penetrates the epithelial cells of the mucosa of the bronchopulmonary system and begins its reproduction. During the reproduction of new viruses, the

infected cell is most often killed. There are no symptoms of the disease in the incubation period, but pathological reactions are already taking place in the body that are aimed at combating the infectious agent and if these protective measures are not enough, then the infectious process develops further.

Coronavirus infection from humans

The time period during which a person is infected is not precisely determined, but data from some studies indicate that a person with COVID-19 is able to spread the virus before any symptoms appear (1-3 days before the first signs of the disease). The most contagious are people at the moment when the incubation period ends and symptoms of the disease appear.

The duration of virus release may vary and depend on the severity of the disease course. In practice, if the patient was in hospital, then he is considered healthy after two negative tests for COVID-19, taken at an interval of 24 hours. When treated at home, three conditions must be met:

- I. At least 7 days have passed since symptoms appeared.
- II. There are no symptoms of coronavirus infection (cough, shortness of breath, etc.).
- III. For three days, the body temperature did not increase.

One important epidemiological indicator is the "baseline reproductive number," which helps predict the scale of infection.

The basic reproductive number shows the number of people who can be infected with one disease around them. The baseline reproductive number for influenza is 1, for COVID-19 is 4, and for DELTA is 10. DELTA is 10 times more contagious than influenza. The new Omicron variant multiplies 70 times faster in the human airways than the Delta strain. A study in Hong Kong showed that Omicron replicates worse in pulmonary tissue.

Natural mechanisms and methods of protection against various strains of coronavirus are described in the works.¹⁻⁵

New strains

The new strain “omicron,” revealed on November 9 in South Africa, continues to excite the minds of scientists, doctors and researchers, generates a wave of discussion in terms of its origin.⁶⁻⁹ Viruses have existed for billions of years, and everyone has their own niche and is only in it. And if a person, for example, ate potatoes infected with a potato virus, then this virus will not be transmitted to him. And in no natural virus, of course, there can be no such mutations; there can be no such thing that they happen so often - in two years there are already thousands of options.

Conclusion

The forecast of Klaus Schwabe (German economist) for the World Economic Forum was released, in which he indicated that the “omicron strain” would appear in May 2022. He showed up earlier. It collects all the mutations that were in previous strains, which in nature, does not and cannot occur. As well as the fact that this strain bypasses all variants of existing vaccines.

The mechanism of coronavirus mutations and the sources of the appearance of new strains have not yet been determined by scientists.

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Conflicts of interest

The author declares there is no conflict of interest.

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