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***Is it possible to defeat infectious diseases***

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*Science has a lot done in the fight against the spread of infections and maintaining control over intact throw the of infectious diseases, and eliminate some of them. Nevertheless, in this struggle of the century, much depends on the coordinated efforts of all countries, organizations and ordinary people.*

*The outbreaks of anti-vaccination sentiment that appear from time to time greatly complicate this struggle: for example, in 2018, a measles outbreak*[*swept across*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://nplus1.ru/news/2018/08/21/measles-record)*Europe and experts warned: a five percent decrease in the level of vaccination of the population will lead to a threefold increase in the number of cases.*

*What prevents the elimination of infection, what eliminate, and which only try to control? Let's define some terms.*

*Disease Control — Reduction of morbidity and mortality from a particular disease to a level that is considered acceptable.*

*Eradication is a planned action leading to the complete disappearance of any infection. Example - eradication  smallpox in 1979, vaccination is not carried out more than that it has proven to win a complete victory over the possibility of infection.*

*Elimination of infection - reduction of the incidence of a certain infectious disease to zero within the boundaries of a certain territory. An example is the*[*elimination of rubella in Russia*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.rosminzdrav.ru/news/2019/02/06/10725-voz-podtverdila-pobedu-nad-krasnuhoy-v-rossii)*. Without example the elimination of the disease in a suit or region does not usually begin a global eradication program.*

*Elimination of the disease - reducing to zero the incidence of a particular form of infection. An example is the*[*elimination of mother-to-fetus transmission of HIV and syphilis in Cuba*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/ru/news-room/detail/30-06-2015-who-validates-elimination-of-mother-to-child-transmission-of-hiv-and-syphilis-in-cuba)*. The infection has not been completely eliminated, but its congenital forms are practically not found anymore.*

*Hepatitis C can be taken as a modern example of a change in attitudes towards a disease. Even 10 years ago, it would have been strange to talk about its elimination: the disease has a long period of asymptomatic carriage, immunoprophylaxis has not been developed, and the percentage of treatment success was very low. But with the advent of antiviral drugs with an efficacy of about 95 percent in the United States*[*, a debate began*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pubmed/29181853)*about the possible elimination of the disease.*

*At the present time, the questions of a radical fight against less "convenient" infections are being raised. UNAIDS plans termination of epidemic of HIV - infection 2030. One of the factors that makes this success possible is modern antiretroviral therapy. Under its action reduce the concentration of virus in the blood, which effectively reduces the risk of transmission of HIV infection.*

*Science offers very different elimination tools, from hand washing to modern antiviral agents. Let us consider them, based on the level of exposure to infection.*

*1. Impact at the level of infected people. Mass antibiotic delivered to the brink of elimination tropical disease*[*yaws*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/yaws/en/)*(India).*

*2. Impact at the level of transmission of the pathogen. Vector control of pathogens is central to the campaign against malaria. In 2016,*[*WHO reported*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://apps.who.int/iris/bitstream/handle/10665/205565/WHO_HTM_GMP_2016.3_eng.pdf%3Fsequence%3D1)*that 33 countries had eliminated malaria.*

*Suppression of the transmission of the helminth Dracunculus medinensis almost eradicated*[*dracunculiasis*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/ru/news-room/fact-sheets/detail/dracunculiasis-(guinea-worm-disease))*. The arsenal of measures used included: the distribution of simple and cheap*[*filters*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.cdc.gov/parasites/guineaworm/prevent.html)*that did not allow parasites to pass through, access to clean water, improving the health literacy of the population and improving hygienic conditions. The number with the beam in the years 1989-2017, according to the Program of eradication of dracunculiasis decreased from 893 000 to 30.*

*3. Impact at the level of healthy people. First of all, of course, we are talking about vaccination, which is central to the plans for the elimination of rubella, measles, mumps and the eradication of poliomyelitis. Before measles was vaccinated, it claimed*[*three*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/news-room/fact-sheets/detail/measles)*to*[*seven*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://onlinelibrary.wiley.com/doi/full/10.1002/path.4457)*million lives a year. In 2015, she died of*[*73 000*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5388903/)*people, despite the fact that in some countries there was a speech about the victory over the infection.*

*A set of qualities that make a disease preventable with  vaccinations:*

* *vaccine must give persistent immunity;*
* *antigens of the pathogen must be constant;*
* *only people should be sick;*
* *also plays the role of the number of times you need to be vaccinated. One of the problems in eliminating diphtheria is that*[*three doses are required*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/immunization/Diptheria_Russian_11Apr08.pdf)*to produce an immune response of 95 percent ;*
* *the vaccine should be as resistant. The 2010 rinderpest eradication campaign was only successful with the development of a*[*heat-resistant*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=http://www.oie.int/doc/ged/d8913.pdf)*vaccine.*

***There are nuances***

*The presence of certain means of fighting a specific infection does not automatically make it eradicate. In practice, one has to deal with additional factors of a different nature. These are the most important biological questions.*

*1. The number of pathogens or their strains. The measles virus is a good target for a vaccine. Despite the existence of several strains, the existing vaccine confers universal immunity against each of them, due to their comparative antigenic constancy. The flu virus and HIV are a thankless target due to their very rapid volatility.*

*2. Reservoirs of infection. There are many pathogens that can go without a person for a long time or permanently; radical struggle with them is very difficult. The reservoir for the pathogen can be animals (influenza, trypanosomiasis, schistosomiasis) or soil (tetanus).*

*Carriers of infections are not an alternative host for pathogens, which can be, for example, a bird for the influenza virus. They can make it difficult to fight infections, but their presence is not a death sentence; the successes in the fight against*[*lymphatic filariasis*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/ru/news-room/fact-sheets/detail/lymphatic-filariasis)*(elephantiasis) and malaria demonstrate this.*

*3. The brightness of the manifestation of the disease. Chronic hepatitis C is a typical example of a long-term course of the disease without symptoms with the possibility of infecting others. With rubella, a person becomes contagious a few days before symptoms appear. This slows down the detection, treatment and isolation of patients, and promotes the spread of the disease. The more expressive the manifestations, the shorter the period of asymptomatic excretion of the pathogen, the easier the control. In addition, a radical fight against infection requires diagnostic tests available in all countries.*

***Infection, politics, economics***

* *WHO and the world community will not try to eradicate the disease just because it is a convenient candidate in biological terms. They will*[*weigh*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446384/)*whether it is a significant threat to public health, what is the combination of the incidence, mortality, social and epidemiological significance of the infection. For example, enterobiasis is rather unpleasant, but tolerable.*
* *Disease control measures should not only be effective and simple, but an important parameter is their relative cheapness. If the eradication campaign proves too costly, disease control may be preferred.*
* *The political situation, traditions and customs, religious views of the population of target countries play a huge role. A good illustration is the Global Polio Eradication Initiative. It is estimated that eradicating the disease will save $ 1.5 billion a year worldwide by stopping vaccinations. The incidence has dropped from*[*350,000 cases in 1988*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.who.int/bulletin/volumes/83/4/268.pdf%23search%3D%25222005%2520%2522%2520estimated%2520polio%2520cases%2522%2522#search=%222005%20%22%20estimated%20polio%20cases%22%22)*to*[*30–40 per year*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=http://polioeradication.org/polio-today/polio-now/wild-poliovirus-list/)*today. The H Yeager began*[*to spread rumors*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1831725/)*that the vaccine sterilizes girls and vaccination - action against the Muslim population. The country*[*'s*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4098042/)*vaccination program*[*was frozen*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4098042/)*for 11 months, resulting in*[*1,143 cases*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=http://www.globe-network.org/sites/default/files/documents/public/en/news-and-events/news/2011/lessons-from-polio-eradication.pdf)*in 2006, up from 202 in 2002.*

*And from funny, curious examples: in 2006, British doctors reported a sharp decrease in the number of cases of pubic head lice due to massive hair removal in intimate areas. Mass fashion helped the parasitic disease disappear.*

*One important, decisive and accounted criteria as a higher efficiency vaccines ( with proper holding circuit ) , which is, for example , during vaccination to rubella-90-100%, hemophilic infection type b / Hib, poliomyelitis, mumps and measles-99%, tetanus-98%, hepatitis A-94%, hepatitis B-86%, diphtheria-80-90%, pneumococcus-73 -90%, tuberculosis-65-78%, flu-60-80%.*

*Unfortunately, none of the vaccines are completely safe. All of them have a certain degree of reactogenicity, which is limited by the regulatory documents for drugs. However, the degree of safety of immunobiological drugs far exceeds that of a huge number of drugs that people take uncontrollably and not as prescribed by a doctor .*

*Factors contributing to the occurrence of adverse reactions can be: violation of production conditions, rules for transportation and storage of vaccines; ignoring contraindications for use, violation of the vaccination procedure, changing the dose of the drug; property of the vaccine, its antigens, auxiliary components and impurities; features of the state of the vaccinated organism.*

*So, to protect children from the negative effects of vaccination, should read the list of medical contraindications to vaccination (attached in the instructions for the vaccine, are reflected in the regulations).*

*The risk of complications after the vaccination (e.g., when measles - 1 case for 1 million doses, live polio-1 per 3 million doses) incomparable m with the risk of complications from infection minutes.*

*At a time when diseases that have caused millions of deaths and disabilities and caused billions in losses are receding and disappearing, we are seeing spikes in anti- vaccination sentiment. One gets the impression that false information about the dangers of vaccinations is known to the population much better than how many serious infections were successfully defeated by immunization.*

*Understanding that scientific medicine with political support can eradicate disease irrevocably is important in countering the spread of skepticism. The elimination of infections is a process taking place before our eyes.*

***Used literature:***
*1. It is impossible to eliminate, N + 1 Andrey Ukrainian.*[*https://nplus1.ru/material/2019/03/01/eradication-infection*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://nplus1.ru/material/2019/03/01/eradication-infection)

*2. Source:*[*https://yaprivit.ru/vaccination/effectivnost-vaccinacii/*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://yaprivit.ru/vaccination/effectivnost-vaccinacii/)

*3. The principles of disease elimination and eradication.*[*WR Dowdle*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pubmed/%3Fterm%3DDowdle%2520WR%255BAuthor%255D%26cauthor%3Dtrue%26cauthor_uid%3D10063669)*.*[*https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2305684*](https://translate.google.com/translate?hl=ru&prev=_t&sl=ru&tl=en&u=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2305684/)