

“DISEASE X” AND MEASURES TO COMBAT THE NEW PANDEMIC

E. V. Karamov, A. S. Turgiev

Gamaleya National Research Center for Epidemiology and Microbiology of the Ministry of Health of the Russian Federation, Moscow, Russia

Viral infections pose the greatest pandemic threat in the modern era, due to the speed of replication and transmissibility of viruses. The recent COVID-19 pandemic has served as a sobering reminder of the dangers of viral pathogens to public health and the need for continued efforts to find adequate responses to this threat. Despite growing investment in pandemic prevention and experience with previous outbreaks – caused by SARS-CoV, MERS-CoV, Ebola and Zika viruses, – humanity was not prepared for the COVID-19 pandemic, which globally resulted in a catastrophic number of deaths and unprecedented economic damage.

The causative agent of COVID-19, SARS-CoV-2, is just one of many pandemic threats. Over 250 zoonotic viruses have pandemic potential, including dengue fever virus, which is estimated to be currently infecting 400 million people in more than 128 countries, and Venezuelan equine encephalomyelitis virus. Moreover, the predicted presence in natural reservoirs of about 1.7 million unknown viruses of mammals and birds, most of which can begin to parasitize the human body, make it completely impossible to timely create efficient means of combating an unknown pathogen after the onset of the outbreak it has caused.

There is a general consensus that the threat of a viral pandemic is an everyday reality we live in; a deadly virus can appear suddenly and spread rapidly throughout the world. Pandemic preparedness and response, therefore, require multi-layered interventions, the means of which are currently lacking, and this gap may be filled if we manage to develop in advance threat-agnostic countermeasures, which are efficient against the future pandemic, regardless of its causative agent.

Three approaches to combating “disease X” pandemic are currently under development: (1) broad-spectrum antivirals, (2) means of targeted delivery of nucleic acids (“cassettes” for mRNA vaccines), and (3) mathematical models capable of predicting the onset of a viral pandemic.
