

17 February 2021

## **BRIEF19**

*A daily review of covid-19 research and policy*

### **RESEARCH BRIEFING**

#### **Vaccinations could limit further mutations.**

As more of the population is vaccinated, an increasing number of people have antibodies against SARS-CoV-2, either via infection or, more safely, via inoculation. Many experts have pointed to vaccination as a way to limit future evolution of the coronavirus into new and possibly more dangerous variants. The overall immune status of an entire population can in essence serve as an evolutionary selection pressure; but that assumes there is enough replication going on for mutations to be under positive selection—meaning that mutations don't just occur but that there are conditions that either favor or disfavor that new version of virus by virtue of some change in its structure and therefore its "behavior." This means that we might see a greater number or more effective so-called escape variants (i.e. variants that evade vaccines). That could happen if one or both of the following scenarios occur:

1. Widespread community transmission persists with slow vaccine uptake.
2. The vaccines don't provide any protection against infection and transmission continues unchecked after vaccination.

Currently, our trajectory is most akin to the first scenario. We need to get transmission under control as we ramp up immunization. The second scenario is far less likely, as several lines of evidence suggest that the existing vaccines in use protect at least partially against infection and thus transmission.

Mutation is a relatively constant process. It happens randomly whenever a virus replicates. Selection pressures themselves don't increase mutation or make the virus mutate differently. They simply refer to the conditions in which mutations occur. For example, if an animal has a mutant that makes its neck longer, that won't give it an advantage if it does not allow it to reach food in trees that other animals can't also reach. So there would be no selection pressure in that circumstance to "select" for the animal with the long neck mutation. But if there were higher branches with food that only long-necked animals could reach, then a selection pressure would exist, and other time, animals with that mutation would have an advantage and perhaps survive while other animals did not.

Similarly, positive selection is when a randomly acquired mutation changes a virus in a way that gives it an advantage based on the prevailing circumstances. In this case, evading the human immune system's weapons would be an advantage. But acquiring mutations is a numbers game, because it happens randomly. When it does happen, it has to be "meaningful" (i.e. there has to be a selection pressure) or else that mutation won't be favored or disfavored; it simply would not even be "noticed." The process is akin to buying lottery tickets. Buy one? Chances of winning are very low. Buy millions of tickets? Your chances go up. Depending on how many millions or billions you buy, your odds increase. Because transmission is so high right now, SARS-CoV-2 is, by analogy, out there buying unlimited Powerball tickets. Thus, as the population's immunity to some variants grows, a selective pressure that favors the occasional new variant amounts to some jackpots for the virus. By doubling down on efforts to reduce transmission while simultaneously ramping up vaccination, we can cut the virus off from its supply of chances to win. Immunization is a major way out of the pandemic. It won't automatically select for vaccine-resistant variants, especially if we do everything we can to knock down transmission now.

—*Angela Rasmussen, PhD*  
(*Brief19* Twitter [Thread-of-the-Week](#)).

## **POLICY BRIEFING**

### **Polar vortex storms delay vaccine distribution.**

Although Tuesday the Biden team announced an increase in covid-19 vaccine distribution week over week by 23 percent, shipments for this week have been significantly delayed by winter [storms](#) affecting major hubs.

A polar vortex has swept the middle of the country from Minnesota down through Texas with sub-zero temperatures, resulting in dangerous conditions at FedEx warehouses which ship the vaccine in Memphis and Louisville. The US Centers for Disease Control and Prevention is working with federal and local agencies as well as private industry to attempt to minimize the delays in vaccine distribution. Many of the areas affected by the winter storms have also had to cancel vaccine clinics due to hazardous weather conditions. It is not yet clear how long the delays are expected to continue but it comes at a time when case counts have finally begun to drop to levels now seen since October.

—*Jordan M. Warchol, MD, MPH*

*Kimi Chernoby, MD, JD, Policy Section Founder, Joshua Niforatos, MD Research Section Editor, Frederick Milgrim, MD, Editor-at-Large, Barb Cunningham, Copy-editor, Benjy Renton, Thread-of-the-Week, Anna Fang, Week-in-Review. Megan Davis, social media. Kane Elfman PhD, Publishing and Design. Jeremy Samuel Faust MD MS, Editor-in-Chief. <http://www.brief19.com/> Twitter: [@brief\\_19\\_submissions@brief19.com](https://twitter.com/brief_19_submissions). Brief19 is a daily executive summary of covid-19-related medical research, news, and public policy. It was founded and created by frontline emergency medicine physicians with expertise in medical research critique, health and public policy.*