

# *Science You Can Use*

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**Dear Science:** I heard that the COVID-19 vaccine made by AstraZeneca (AZ) can cause blood clots. 12 European countries temporarily stopped using the AZ vaccine because some of the people who received the vaccine developed blood clots. This makes me reluctant to get any COVID-19 vaccination. What should I do? -- Buck R.

**Dear Buck:** The short answer is that you should get any COVID-19 vaccine you can at the earliest time you are eligible to do so. In a nutshell, here's why. The available data says that, all else being the same, the risk of clots among those who have received the AZ vaccine is no higher than the risk of clots among those who have not received the vaccine. All else being the same, not getting a COVID-19 vaccination doubles the risk you will die this year.

Let's look at this recommendation in some detail. All risks and rates in the following are per year, unless otherwise noted.

As of 18 March 2021, there were about 40 diagnosed cases of blood clots among the 17 million individuals who had recently received the AZ vaccine (about two people per million were diagnosed with blood clots shortly after vaccination). The number of people who were diagnosed with blood clots during the same time but who had not received the AZ (or any other COVID-19) vaccine was about one person per thousand, which is 500 times *higher than* the occurrence of blood clots among those who did receive the vaccine.

In addition, AZ's own testing of the vaccine on about 50,000 people prior to public release of the vaccine did not show any effect of the vaccine on the occurrence of blood clots.

Therefore, nothing in the data we have even hints that the AZ vaccine could cause blood clots.

Why, then, did 12 European countries temporarily suspend use of the AZ vaccine, pending a review of the blood clot cases among those who had been vaccinated? In the absence of any other information, this group of people *might be* peculiarly prone to get blood clots from the AZ vaccine. *If* the suspension would not greatly increase the risk that more people would die from COVID-19, and *if* suspending the vaccination effort for a *few days* would allow us to determine whether the vaccine increased the number of people with blood clots, it would make some sense to suspend AZ vaccinations briefly. On 18 March 2021, the European Medicines Agency, which is the organization responsible for evaluating the safety and efficacy of medicines for the EU, reported that after a careful review, there is no evidence that the AZ vaccine causes blood clots. AZ vaccinations have resumed in Europe.

It is easy in settings like the European AZ vaccination programs to back into a reasoning error we can call the "microscope fallacy". A microscope can make the tip of a hypodermic needle look like a jagged saw. If we "look" closely enough at just about anything, we will see some kind

of anomaly. The anomaly, under intense scrutiny, can seem huge. It's a short step from there to focusing attention on the anomaly while ignoring potentially more important considerations.

To avoid the microscope fallacy, we have to keep risks in perspective. What does that mean in practice? Everything we do, including drinking a glass of water, carries some risk of death, so all we can do is choose among those risks. Every vaccine, no matter how thoroughly it is tested, carries a tiny risk of death – about 100,000 times *smaller* than the risk you will die in a traffic accident this year. In contrast, all else being the same, *not* being vaccinated for COVID-19 roughly doubles the risk you will die this year, and that risk is approximately 100 times greater than the risk you will die in a traffic accident this year.

Given these considerations, the rational choice is to get vaccinated for COVID-19 as early as you are eligible to do so. (Get vaccinated even if you have had COVID-19 and recovered, because the evidence we have strongly suggests that the Pfizer, Moderna, and AZ vaccines provide a higher level of immunity – especially to COVID-19 viral variants that are now spreading across the planet -- than naturally acquired immunity.) Contact your physician or local county public health department to find out when and how you can get vaccinated. Be patient: there is a huge demand for COVID-19 vaccines right now, but only a limited supply in most areas.

For further information, see Centers for Disease Control and Prevention (CDC), COVID Data Tracker, <https://covid.cdc.gov/covid-data-tracker/#datatracker-home>. See also CDC, Data and Statistics on Venous Thromboembolism, <https://www.cdc.gov/ncbddd/dvt/data.html>.

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