COVID-19 Vaccination
Frequently Asked Questions

By Dr. James A. Avery

1. **How is it that we have managed to get vaccines developed so quickly?**

   Dazzling scientific progress, a tremendous response from volunteers for the clinical trials, focused and substantial government investment, new technology (like the messenger RNA vaccine), "at-risk" manufacturing, and the good fortune that our immune systems can fight COVID-19. All this together seems very likely to have given us an unexpectedly strong and safe vaccine against this new virus. If we use this new tool (the vaccine) well, we can end the pandemic's misery, save hundreds of thousands of lives, and set the U.S. and the world on a pathway to rapidly recover from this plague.

2. **How many vaccines are under development?**

   As of November 24, 2020, there were Phase 3 clinical trials in progress or being conducted for five COVID-19 vaccines in the United States.

3. **Will there be enough vaccine for everyone?**

   Not everyone will be vaccinated right away, but the supply will continually increase in the weeks and months to follow. Because safety is so crucial, any potential problem with vaccine production can result in unavoidable delays. Even in the best-case scenario, it will be late winter or early spring before we have enough vaccine to drive risk down far enough to get life back to some version of normal. But, unless there is a serious setback in manufacturing or administration, everyone who wants a vaccine should be able to get one by late Spring 2021.

4. **Is the federal government going to mandate a vaccine?**

   Both the current President and the President-elect have spoken out against mandatory vaccinations.

5. **If you have already had COVID-19, do you still need to take the vaccine? Should we be tested for antibodies to "prove" we have had the virus?**

   Clearly, people who have had the infection already have some degree of immunity and are at less risk for infection, but they will still benefit from the vaccine. Think of it as an extra layer of protection. But we are still waiting to hear a definitive answer from the CDC and the NIH on this topic. Stay tuned.

6. **Can a COVID-19 vaccine be given with the flu vaccine?**

   Current recommendations are to wait 14 days after getting a COVID-19 vaccine before getting other vaccines. And no patient should receive the COVID-19 vaccine having received other vaccinations within 14 days.

7. Can a COVID-19 vaccine be given when a person is sick with the flu or another infection?

It's safe to receive vaccines (influenza or COVID-19) if you're sick with a very mild illness and don't have a fever. Some examples of mild illness include allergies, colds, mild sinus infections, and mild diarrhea. But, a good rule of thumb is to speak to your doctor prior to receiving the vaccine if you're currently sick with a fever or have a moderate to severe illness. They may decide to delay your COVID-19 shot until after you've recovered.

8. If a person takes the vaccine, can they still be infectious – can they spread it to others?

While unlikely, a person who has the vaccine can transmit it to others after being exposed. In other words, during the short time that their body is fighting the virus from the exposure, they can infect others.

9. Do you have to take the vaccine more than once?

The Pfizer vaccine (approved on 12/10) and Moderna vaccine (due to be approved on 12/17) both require two doses. The second Pfizer dose is given three weeks later, and the Moderna vaccine is given four weeks later. All of the other vaccines in phase 3 trials require two doses except one – the Johnson & Johnson vaccine.

10. How long will it take for the vaccine to be effective?

From the data presented by the companies, both vaccines are already effective 7 days after the second dose.

11. Who is paying for the vaccine?

Vaccine was purchased with U.S. taxpayer dollars and will be given to the American people at no cost. However, vaccination providers will be able to charge an administration fee.

12. Why does the Pfizer vaccine have to be stored at -70-90° and the Moderna vaccine doesn't?

Here's a long answer because I couldn't think of a way to make it shorter.

The fundamental problem is that mRNA is easily destroyed, and that's because there are many, many enzymes that will just break it apart. Here's a simple analogy: Think of the vaccine as a chocolate bar that melts easily. Just as there are ways to keep the chocolate from melting into goo, there are things the drug makers did to protect their COVID-19 vaccines.

The first step was to modify the mRNA nucleosides — the "building blocks" of the RNA vaccine. They've used modified versions because those are more stable. This would be like changing the chocolate recipe, so it's not quite so "melty."

The next step was to use lipid nanoparticles, which, is kind of like putting your chocolate inside a candy coating — you have an M&M, so the chocolate doesn't melt. But even with the stabilized building blocks and lipid coating, the mRNA could still fall apart easily, which is why the vaccine is frozen.

Bottom line: Everything happens more slowly as you lower the temperature. Therefore, the chemical reactions — the enzymes that break down RNA — are going to happen more slowly. Because the specific formulations for both companies are secret, it's not clear exactly why these two mRNA vaccines have different temperature requirements but, "cold" makes sense.

13. What is the research showing for those who are pregnant taking the vaccine?

The American College of Obstetricians and Gynecologists (ACOG) has offered guidance on vaccinating pregnant and lactating women with the Pfizer COVID-19 vaccine. ACOG currently recommends that COVID-19 vaccines should not be withheld from pregnant individuals who are eligible for vaccination-based priority groups outlined by the CDC's Advisory Committee on Immunization Practices (ACIP). ACOG also recommends that vaccines should be offered to lactating individuals based on their priority group.

14. Is the vaccine safe for those who are allergic to eggs/shellfish?

Completely. Both the Pfizer and Moderna vaccines are messenger RNA vaccines and do not use eggs or shellfish in the manufacturing process.

15. What are the current side effects of the vaccines mentioned?

For the Pfizer Vaccine: Fatigue (3.8%), Headache (2.0%) For the Moderna Vaccine: Fatigue (9.7%), Myalgia (8.9%), Arthralgia (5.2%), Headache (4.5%), Pain (4.1%), Injection-site redness (2.0%)

16. Do these mRNA vaccines modify the recipient's DNA?

I should probably take a moment here to discuss the difference between DNA and RNA, which is what's used in these vaccines. They sound very similar, and they do work together, but their roles are very different. DNA is the language of a person's unique genetic code – you don't want to mess with someone's DNA. But cells don't make proteins directly from DNA. First, they transcribe the code to what's called mRNA, for messenger RNA, and then they make proteins from the messenger RNA. The RNA is rapidly degraded once its mission is accomplished.

Therefore, we sometimes call messenger RNA, non-replicating RNA in order to make it clear these have nothing to do with one's genetic or inherited code. All of the message RNA vaccines use non-replicating cell lines; DNA is not even in the picture. Messenger RNA or non-replicating RNA is a temporary code used to make protein, and it is gone once the message is delivered and the protein manufactured.

17. What are the adverse reactions or rate of complications for people of color as they are most impacted from COVID 19?

I have not read about any difference in adverse reactions, and that makes sense clinically and pathophysiologically. One postulated reason for the increased vulnerability of some races of the virus appears to be related to the way the virus enters the cells via certain receptor molecules - that is not an issue for either vaccine. The vaccine should work the same on everyone in the human race.

18. Do I still need to wear a mask and avoid close contact with others if I have received 2 doses of the vaccine?

The short answer is "yes." Together, a COVID-19 vaccination and following infection control practices are the best way to protect yourself and others from getting and spreading COVID-19. Eventually, once a critical number of people get vaccinated, the CDC will stop recommending people wear masks and avoid close contact.

19. I am hearing a new term I am not familiar with - what is "at risk" manufacturing?

It is one of the reasons scientists have developed this vaccine so quickly. In "normal times," a vaccine is developed, tested and then approved. Only then does the pharmaceutical company manufacture large amounts. However, the federal government decided to finance the production of five vaccines before they were even proven to be safe or effective with the understanding that all of these vaccines would be discarded if the vaccines failed to meet expectations. This was clearly a gamble and one that ended up being wildly successful.

20. Are there other vaccines or supplements that can prevent me getting COVID-19?

There are no available vaccines or supplements that will prevent COVID-19 despite what you might see on unreliable internet sites.

21. Does immunity after getting an COVID-19 infection (natural immunity) last longer than protection from the COVID-19 vaccine?

Natural immunity is quite variable as it depends on the individual, the severity of their infection, and other comorbidities and factors. Less discussed but very encouraging are the results of three new studies appearing to show that infection with the virus creates a high level of immunity to COVID-19. In the first study, examining a large outbreak on a fishing ship, none of the three people with antibodies got sick, while nearly everyone else got infected. In the second of an outbreak at a summer camp, none of the 16 people with prior antibodies got sick or tested positive, while nearly everyone else did. More recently, a preliminary report from a study of infected health-care workers found that immunity appears strong and seems to last at least six months. This also means that the 15% to 25% of the U.S. population that will have been infected before vaccination becomes widely available appears likely to have pretty good immunity for at least some time.

The fact that our own immune system appears to work effectively against COVID-19 bodes well for the power of the new vaccines, but we won't know how long immunity lasts from the vaccine until we have an approved vaccine and more data. But both natural immunity and vaccine-induced immunity are important when we think about taming this pandemic.

22. Is requiring two doses going to be a challenge?

All three of the vaccines that have shown promising results require two doses several weeks apart, which more than doubles the logistical challenge. (And, yes, two doses are needed. The Johnson & Johnson's vaccine is being touted as a single-dose, but we won't know whether it works for at least a few more months.) We will need sophisticated education and follow-up to reduce the number of people who skip the second shot.

23. Why are nursing home residents and staff getting vaccines first?

Nursing homes have been and are ground zero of this pandemic, accounting for some 40% of deaths in the United States. As a CDC advisory group recognized last week, nursing home residents and staff should be at the front of the line for the vaccine, alongside health-care workers elsewhere. If we can give most of this group two doses of vaccine by the end of January, it would save thousands of lives.

24. Are there any new treatments on the horizon?

The most promising of these are monoclonal antibodies—lab-made proteins that mimic the human immune system's ability to battle infections—which appear to reduce COVID-related hospitalization and emergency department visits, though they haven't yet been proven to reduce death rates. The antibodies must be given early in the course of the disease, and giving them isn't simple: it takes an hour-long intravenous infusion, followed by at least an hour of monitoring for a severe reaction.

Nursing homes and some assisted-living facilities may prove to be excellent locations for early treatment of residents since patients can be separated from others, and nursing staff can administer the antibody infusion. This could save many lives and reduce hospital overload while we wait for vaccines to become more widely available. But logistical issues remain, including staffing issues - scaling up administration of these new "wonder drugs" will be difficult.

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