FSU professor discusses viability of COVID-19 vaccines

Ella Hechlik  Staff Writer
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Pfizer and Moderna are two companies currently working on development and testing of the mRNA vaccine for SARS-Cov-2, the virus that causes COVID-19. However, many have questions and concerns about how exactly the vaccine will work, and what it means for students at FSU.

According to Zucai Suo, an eminent professor and Dorian and John Blackmon chair in Biomedical Science at Florida State University, “The Moderna nanoparticle is more stable, so it can be stored at 4 degrees Celsius. In contrast, the Pfizer one has to be at minus 80 degrees Celsius which is really cold so that means it needs to be stored in a freezer, so Moderna is going to be better because it is more temperature stable.”

However, there are still a lot of questions about safety, duration and logistics of the vaccines, all of which take time for scientists to determine based on data. And as of now the only data released has come from the companies themselves and has not been peer-reviewed.

An mRNA vaccine means that messenger (m) RNA is being used to encode a specific protein that the COVID-19 virus has—the spike/s- protein—which is what binds to the healthy host receptor cells in humans.

Instead of using a traditional attenuated virus, which means the live virus is injected through the vaccine (e.g. chickenpox), the mRNA vaccine focuses solely on the spike protein which sits on the surface of the virus and makes it easier for it to bind to healthy human cells.

Essentially, the mRNA is translating the spike protein from the virus, so that the body recognizes that piece as a foreign “invader” and begins to create antibodies for the spike protein. That way, if the real virus makes it into a body, the immune system recognizes the spike proteins displayed on the surface of the cells and has an immune response to eliminate it.

According to the Centers for Disease Control and Prevention, mRNA vaccines have been studied for over a decade by scientists, but none have been officially approved for use, as there are complications in using this vaccination method.
However, the companies do have to modify some of the building blocks of the mRNA so it is more stable and the vaccine is able to enter the cell. This is done through the use of nanoparticles, which the mRNA is surrounded by, so that it can attach to the human cell’s lipid bilayer membrane and is not dissolved by enzymes when it tries to enter the cell. Pfizer and Moderna vaccines use two different nanoparticles.

So, essentially what the companies are doing is translating just that protein from the virus so it isn’t forming the whole virus inside the host. The mRNA is more stable because they use a nanoparticle. The two companies use different nanoparticles.

As of now, all viable COVID-19 vaccinations require more than one dosage or shot per person according to Suo.

Data gathered in clinical trials shows that the efficacy rate is high—at around 90 percent—for the vaccines at an early stage of clinical trials. This means that the lower the infection rate in vaccinated people is, the higher the efficacy of the vaccine is rated.

The Food and Drug Administration (FDA) still has to go through an approval process for the vaccine to become available for all Americans to take.

“In many experts’ opinions, the vaccine will be distributed to the general public by next April, which is soon,” said Suo. “There are some issues, but the data looks very encouraging. Plus, the technology that is being developed can be used for later viruses and even anti-cancer treatments in the future.”

The Medicines & Healthcare Products Regulatory Agency (MHRA) in the U.K. has approved Pfizer’s vaccine to be used in emergency situations in certain circumstances. As for the general public, the FDA has announced a statement on authorization in the month of December.