

Science can save us – again

As devastating as the COVID-19 pandemic has been, it is not the first or even the worst of infectious disease outbreaks. Smallpox scoured the world for hundreds of years until a vaccine became available and led to its global eradication in 1979. There was never a good treatment for the disease, just vaccine prevention. Before 1955, thousands of children afflicted with polio relied on an iron lung machine. Don't believe in the magic of vaccination? Just ask your grandparents or an old friend what happened to polio. If you do not believe in the value of vaccination, you will have a hard time explaining how these diseases disappeared.

Vaccines have proven to be the most cost effective and lifesaving method to prevent infection, second only to the sanitization of water. Vaccinations have received a bad rap. They have even been mistakenly accused of causing the rise in autism. The action of vaccines can be simply explained.

When a virus, bacteria or other infectious agent enters the body, it responds by activating its immune system. In a complex, divinely structured defensive system, the body recognizes elements of the attacking agent and produces proteins called antibodies, which seek out and neutralize the attacker. In COVID-19 our immune system, our own antibody production leads to recovery in the great majority of cases, but it has not been enough for 260,000 people in our country and millions around the world who have died from the disease.

Enter the soon-to-be-available COVID-19 vaccines. You soon will hear that an RNA vaccine is ready for use. As you decide whether to get in line for the vaccine, you might want to understand its method of action. Scientists from around the world studied the structure of COVID-19 virus. They determined its makeup, each component—particularly the protein sticking out of its core—a protein that the body identifies to attack with antibodies. The vaccine will be made up of RNA, which is the chemical that messages the cells of the body to code for and create the antibody that is known to kill the virus.

When we get vaccinated, our cells see this message and make the precise antibody. If everyone gets vaccinated, we will all have these protective proteins, and when the virus invades, there will be an army of antibodies that will prevent infection. The cells which produce the antibody will also remember the virus if necessary, in the future.

How do we know if this is science or science fiction?

Enter the clinical trial. Lots of patients—thousands—get the vaccine while others get an injection of essentially nothing (called the placebo group). Both groups are followed to see who gets the ever-present COVID-19 infection. The scientists that made the vaccine can only watch and hope it works with no dangerous side effects.

There are now at least two vaccines that are 90% or more effective after studying a large, diverse group of volunteers. For every 100 volunteers in the placebo group that ultimately got COVID-19, only 10 in the vaccine group became ill. No vaccine is 100% effective, but 90% is about as good as it gets.

When a group of people, say the State of Texas, has a citizenry among whom 70% have immunity (antibody), the pandemic is over. The virus just cannot find enough people to keep it going. With the new vaccines having 90% effectiveness, we just need about 80% of the population to get vaccinated ($90 \times 80 = 72\%$). We can begin to celebrate that science has potentially saved us from the continued tragedy of COVID-19, from the death, suffering and the economic chaos of this the second most serious pandemic in our country's history.

Science can prevail against COVID-19 as it has smallpox, polio, measles and many other infectious diseases that we now rarely see. But the fight to stop COVID-19 is just beginning. The battle now goes from scientists and physicians to the public. Success, survival and return to normalcy will depend on whether the people of our country will accept the opportunity to get vaccinated. Those in line for vaccination can be added to the front-line heroes of COVID-19.

Please give science the chance to save us again. Let COVID-19 go the way of polio and smallpox. Have faith in our scientists and physicians. Before getting the vaccine, you will be told about potential side effects. There have been some allergic reactions reported from the U.K. Expect some pain at the injection site, muscle aches and a low-grade fever. While long-term side effects from the vaccine are extremely unlikely, those who have had COVID-19 are reporting long-term health problems.

Science produced by human ingenuity is coming soon to save the day, again. Getting vaccinated is an individual decision. Choose to get the COVID-19 vaccine for yourself, your family, your country.

Steven L. Berk, M.D., is executive vice president of the Texas Tech University Health Sciences Center, dean of the School of Medicine and an infectious disease physician.