

THE SCIENCE OF VACCINES

World may need multiple Covid-19 vaccines, not just Sputnik V

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SPUTNIK V is perhaps Russia's attempt to relive the glory days when it was leading the space race during the Cold War years. Why is there so much scepticism surrounding it when Russia does have the biomedical know-how to develop vaccines as do many other countries?

The concept of a vaccine is not complicated. Provide a material, referred to as an antigen, that the immune system can recognise and produce antibodies against, thus protecting against future infections. The antigen can take various forms. The antigen is usually the disease-causing organ-

ism, referred to as a pathogen.

This is akin to a policeman having a "wanted" poster and knowing who to look for. The body now has a "wanted" poster of a possible infectious organism and can apprehend the offenders before they start a disease.

Antigens can be a weakened or dead form of the pathogen. Using our "wanted" poster analogy, even a picture of the face may be sufficient, or in some cases, a drawing that may not be of the criminal but close enough for recognition.

Edward Jenner, the English physician who founded the concept of a vaccine, had used an antigen that was similar to the smallpox virus that caused the milder disease of cowpox but yet produced antibodies that protected against smallpox.

Getting the immune system to respond accordingly is the challenge. Sometimes, the antigen does not result in a sufficient protective response. This is why scientists experiment with different ways of generating the antigen hoping that one of the antigens or

method of presenting the antigen to the immune system will elicit the correct response and result in the production of immunity.

This testing phase can be long to ensure the vaccine does not cause detrimental responses, such as not providing enough protection against infection, or worse, causing the disease it was intended to prevent. Other negative reactions include allergies or various side-effects that could quickly cause the patient to deteriorate.

This is why Sputnik V is met with scepticism. In terms of testing phases, it is behind many others. But Russia recently amended its laws to allow a much earlier phase to be legally distributed as a working vaccine. So although several other vaccine candidates are at a more advanced stage, they are not ready, while the much earlier stage Sputnik V is already being distributed to the public.

The issue is not whether it works

or not. It is quite possible that Sputnik V is actually an effective vaccine. What we want to avoid is a vaccine that will provide a false sense of security when those who have been vaccinated feel that they are immune when they are just as vulnerable if not more so.

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Candidates that are near the final phase of testing are showing promising results. But the world may need multiple vaccines, and like influenza, these vaccines may need to be constantly developed and refined to keep up with the virus as it evolves.

While we want to stop this disruptive pandemic, we must avoid being careless with new vaccines and new drugs to rid ourselves of Covid-19. Once a vaccine is available, the population needs to get vaccinated quickly to stop the disease and prevent the virus from evolving, resulting in the vaccine no longer being effective.

We must, therefore, ensure no

ammunition is provided to the anti-vaccine lobby to ensure the population's compliance with future Covid-19 vaccination programmes. In parallel, efforts to develop drugs or repurpose existing drugs for Covid-19 must go on.

One interesting potential therapeutic agent is the concept of a decoy that will prevent the Covid-19 virus from infecting the human host. This research was recently published in the journal *Science*. In that work, the scientists reported being able to engineer synthetic ACE2 proteins that Covid-19 viruses may prefer to bind to more than the human ACE2 proteins.

ACE2 proteins are entry points of the virus into host cells. By attaching to decoys, the infection of the host is prevented or is less severe due to a lower viral load.

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