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NEWS ANALYSIS

Covid-19: Oxford team begins vaccine trials in Brazil and South Africa to determine efficacy

Developers say that they are exploring every avenue to find an effective vaccine for covid-19. Elisabeth Mahase reports

Elisabeth Mahase

Vaccine developers at the University of Oxford have begun testing their covid-19 vaccine candidate in multiple countries around the world, in the hope that it will increase their chance of determining efficacy.

Sarah Gilbert, a professor of vaccinology who is leading the project, said that the low levels of transmission in the UK now meant that there was "little chance of determining efficacy" in the country. But the developers have had numerous offers from other countries wanting to run efficacy trials and have now started work in Brazil and South Africa, with another country in Africa set to follow, as well as a trial in the US.

"Our problem is knowing where transmission will be in four to six weeks' time. It's very difficult to predict, so we are working in multiple settings," Gilbert told the House of Lords Science and Technology Committee on 23 June.[1] But she said that the sooner the developers—or any other team around the world—could get a signal of how effective a vaccine was and the level of immunity it generated, the sooner they could share this information, so that other teams could understand whether their vaccines were likely to work.

What vaccines are being developed in the UK?

Gilbert's team is using an adenoviral vector that has had some of its genes removed. "This means that, although it will infect the person, it cannot spread through the body, so it's very safe," she explained. "What we do is take the gene for the spike protein out of the coronavirus [and] put that into the adenovirus. Once you vaccinate somebody, the adenovirus will go into the body and make that spike protein and causes an infection in that cell it has reached.

"So, it alerts the immune system that there is something going on, and there is a large amount of this spike protein which the immune system needs to respond to. That alerts the immune system to make the antibody and T cell response directed against the protein. Then when that person encounters the coronavirus in the future, they have antibodies, they have a cytotoxic T cell response, they can recognise the first infected cells and destroy them to stop it spreading further."

The vaccine candidate has now been licensed by the drug company AstraZeneca.

Meanwhile, at Imperial College London, Robin Shattock, head of mucosal infection and immunity, is leading a team working on an RNA vaccine candidate, which will deliver genetic instructions to muscle cells to make the spike protein on the surface of the coronavirus and lead to an immune response.

Platform technology

Gilbert said that the benefit of platform technologies used by the Oxford and Imperial teams was that they sped up the whole process.

She said, "In the past, when we used to start on vaccine development by using the pathogen itself and either making an inactivated or live attenuated vaccine—both of those were slow processes and, because it was new every time and you were starting with a pathogen, it required an enormous amount of time spent on safety testing before you could start to do anything else.

"The approaches that we are taking now only use one of the genes to make one of the proteins from the pathogen, and the rest of the technology is something that is already well known. This means the safety testing does not take as long, that the means of manufacture is known—in our case that was accelerated in the spring of this year—and the clinical trials can be accelerated because we have already seen from the use of these technologies in other diseases, what they can do, and how they perform in different ages and in some cases those with compromised immune systems."

Every avenue explored

However, Gilbert added that every possible different way of making a vaccine was being explored around the world. "We're throwing everything at it," she explained. "Apart from the adenovirus, people are using the pox viruses in a similar way. There are DNA and RNA vaccines. All of these technologies are using the same spike protein gene. We are also seeing the more traditional forms of vaccine development being applied, such as an inactivated version of SARS-CoV-2 and a live attenuated version."

More than 125 potential vaccines are currently in pre-clinical trials. Only three candidates have so far reached phase III testing, including the University of Oxford vaccine. Another vaccine (an inactivated virus) in phase III, developed by the state owned Chinese company Sinopharm, is also set to be tested in another country—this time the United Arab Emirates—owing to a lack of cases.[2]

1 ParliamentLive.tv. Science and Technology Committee. 23 Jun 2020. https://parliamentlive.tv/Event/Index/41636f18-17e7-40bc-ae18-7b1d91c28564.

2 China to run human coronavirus vaccine trial in UAE. *Reuters* 2020 Jun 23. https://www.reuters.com/article/us-health-coronavirus-china-vaccine/china-to-run-human-coronavirus-vaccine-trial-in-uae-idUSKBN23U2H8.