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From Oxford to an Italian lab, one trial vaccine is further along than others

U.S. and European officials are putting support behind project

BY CHICO HARLAN AND STEFANO PITRELLI

POMEZIA, ITALY — On a day in mid-March — as the pandemic began to grip the world — a box from Oxford University arrived at a lab south of Rome.

In it, packed with dry ice, were several tiny vials. Each one held a few drops of "seed stock," a starter kit for the production of a potential vaccine for the novel coronavirus.

The company's job was to turn a few droplets into an amount large enough for 13,000 people — a sufficient quantity to perform large-scale trials unfolding on several continents.

"We could really feel the pressure," said Francesco Calvaruso, the production manager of Advent, which needed two months to grow, filter and purify a trial vaccine known as AZD1222.

That vaccine, like all the others designed to combat the pandemic, remains unproved. But it is further along in the trial process than the others, and it has turned into the West's best — and perhaps only — chance to have a viable vaccine before the end of the year.

Oxford manufactured its own vaccine for use in the earliest small trial known as Phase 1. But for the far larger ongoing trials — involving tens of thousands of people — it turned to Advent, a division of a larger group known as IRBM, which for a decade has focused on making one particular type of experimental vaccines, using adenoviruses.

The notion of having a vaccine so quickly — when the process of experimentation and approval normally takes a decade — might have seemed fanciful at the beginning of the outbreak.

But given the scale of the pandemic and the speed at which scientists are racing ahead, European countries are lining up behind the Oxford University project, saying the early signals give grounds for optimism.

Last week, Italy, Germany, France and the Netherlands struck a deal for 400 million doses of the experimental Oxford vaccine, which, if approved by regulators, would be produced by the Anglo-Swedish drugmaker AstraZeneca. That company has also reached similar deals with Britain and the United States, where the Trump administration has supplied $1.2 billion in funding.

"We can't imagine to only bet on this vaccine," Italy's health minister, Roberto Speranza, said in an interview. "But this is the vaccine our scientists think will arrive before the others. In this moment, there is no other company saying we could have the vaccine by the end of the year."

Speranza, in a visit to the lab, told the company's employees that "this vaccine may be among the most promising. It gives me goose bumps to think that we're talking about the chance to save human lives."

In the global race for a coronavirus vaccine, more than 100 labs, universities and drug companies have started off on experimental missions. But just 11 candidate vaccines, according to the World Health Organization, have reached the stage of clinical testing. The WHO says that only Oxford University's vaccine has reached what is known as Phase 3, the final and largest-scale trial.

The vials produced at this trim landscaped science campus on the outskirts of Rome are being used in those trials, which are taking place in Britain. AstraZeneca also won approval to conduct a trial in Brazil, seeking volunteers in parts of the world where the pandemic is raging. Advent is also producing a batch of doses that will be used in trials in several African countries.

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Researchers work Thursday at Advent, an Italian lab that has spent two months growing, filtering and purifying a coronavirus vaccine that has the potential of being viable before the end of the year.

The Oxford lab had a headstart because it had already been working on a similarly styled vaccine to prevent Middle East respiratory syndrome, or MERS, another coronavirus-caused disease that was first detected in Saudi Arabia in 2012. Oxford says its new candidate vaccine, for the virus that causes covid-19, proved effective and safe with rhesus monkeys during the earliest stage of experimentation.

"There is quite a strong probability that the vaccine will work," said Walter Ricciardi, the World Health Organization's Italian government adviser.

But the vaccine is far from a sure thing, according to experts.

It might not work, or it might give immunity to only some of those who are injected. Even once a vaccine makes it to market, it remains unknown whether it will offer long-term protection, or only for a year or two. The world will ultimately need more than one vaccine anyway, as demand will soar beyond what any one company could produce.

"The expectation is that we will have a protective vaccine. Probably more than one," said Antonio Cassone, the former head of the infectious-disease department at Italy's national health institute. "But nobody will know at that time how long the protection will last. We don't know the antibody duration. This will be yet another jump into the unknown."

A Chinese biotech firm has reported encouraging results in early-stage clinical trials and is also among the front-runners to crack the vaccine code. Any country that produces the first effective vaccine will earn not only a dose of national pride but could also have the chance to distribute the first doses to its own citizens, a major advantage in returning to economic normalcy.

Speranza, the health minister, said Italy would be willing to turn to any country that produces the vaccine, including China.

"We will do whatever is needed to get to that point" of protecting people, he said.

Stefania Di Marco, Advent's lead scientist, said the process of turning several drops of seed stock into three or four liters of vaccine is "not straightforward." She said the scientists had to create conditions in which the seed stock would grow into a far larger mass. Then, scientists had to remove impurities using a gel that isolates the vaccine from the contaminants.

"If it didn't work," she said, "this would mean two to three months of work thrown away," and the timetable for the vaccine delayed.

There are several kinds of vaccines, and the one developed by Oxford uses a tweaked version of a virus found in chimpanzees — something that, if injected into a human body, is supposed to trigger an immune response. The chimpanzee virus is loaded with a synthesized reproduction of the coronavirus's most important weapon, the spike protein that it uses as a harpoon for human cells.

The goal, Di Marco said, "is for the body to think, 'Okay, this is the real virus.' "

Oxford University said it would not provide comment while trials are in progress.

In late April, AstraZeneca announced a deal with Oxford for the global development and distribution of the potential vaccine. In June, it agreed to a license with an institute in India that would supply doses for low- and middle-income countries. Advent said it did not yet have a similar deal in place, but it expects to produce the vaccine if it is approved by regulators.

"We'd surely remain part of the game," said Piero Di Lorenzo, IRBM's chief executive. "We have offered our help to AstraZeneca and the Italian government, and we are waiting for them to tell us how to proceed once tests are over."

"Now," he said, "we need to cross our fingers and get going to wait for the response of science."

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