

It took South Korea only 3 weeks to produce the Covid-19 test kit, and this is their secret weapon

Seegene is producing about 10,000 test kits each week and each can test 100 patients, which means they are producing enough kits for 1 million screening cases each week, with only The cost for each test is less than 20 USD. Noh Si-won said it was his first time t

Before South Korea confirmed the first case of corona virus, one of the country's biotechnology companies was preparing to produce a test kit. On January 16, Chun Jong-yoon told his team that it was time for them to focus on the new strain of corona virus.

" *Even if no one asks, we have to prepare in advance. Because we are a molecular diagnostic company ,*" founder and CEO of Seegene, a molecular biotechnology company. based in Seoul recalls.

It was before the acute pneumonia that swept through China was named Covid-19, also four days before South Korea confirmed its first case.

After that, the epidemic in Korea continued to evolve rapidly. Within just 2 months, they had more than 7,800 cases of infection and 60 deaths, becoming one of the most affected countries by Covid-19 outside China.

But the high number of South Korean infections can be explained by what the country does itself, namely a thorough testing strategy to identify all Covid-19 infections.



Staff at Seegene's headquarters, Seoul, South Korea are working at full capacity on March 6.

While some countries do not have enough Covid-19 test kits to diagnose suspected patients, Korea has provided free rapid test kits to every patient whom the doctor finds they need. have to do tests.

The Korea Centers for Disease Control and Prevention (KCDC) knows the country has 118 health facilities that can perform Covid-19 diagnostic tests. All are under supervision and must be reported to KCDC. To date, a total of 230,000 people in South Korea have been tested for Covid-19.

They even deploy testing stations right on the highway. Drivers will pass through it, stopping for a moment for health-care workers wearing full body protective gear to sample fluid from their throat and nose.

This medical checkup takes only a few minutes and neither the driver nor the passenger need to leave their vehicle.

" *Detecting patients at an early stage is very important,* " South Korean Health Minister Park Neung-hu told CNN. " *Korea is an open society and we want to protect everyone's freedom of movement and movement. That's why we conduct mass testing.*"

But if a country wants to reapply this option, it must first have the same Covid-19 test kit as Korea.



Quarantine activities at testing stations in Korea.

The secret weapon

In the basement of Seegene headquarters in Seoul is the place containing the key to their success with the Covid-19 epidemic. It's a big data system based on artificial intelligence, which helped the company quickly develop a corona virus test kit.

These test kits are packaged into jars containing chemical solutions. Samples taken from the patient's airways are then mixed into the solution. Their response will indicate whether certain genetic fragments of the Covid-19 virus are present.

In the past, when Seegene was not available, it would normally take 2 to 3 months to successfully develop such a test kit. But this time, they finished after only a few weeks.

On January 24, Korean scientists placed orders for the raw materials they needed to produce the kit. Four days after the goods return. And by February 5, the first test version is ready.

This is the third time Seegene uses its supercomputer system to design test kits for a disease. The work was previously undertaken by manual R&D teams around the clock.

Now that the difficult task has been transferred to computer systems, only a few employees need to be involved in the process.



A production line at Seegene's headquarters, Seoul, South Korea, March 6.

However, researching these test kits is only one step. The next step also needs to be shortened is to check the permission to use them. In Korea, the application and approval process from KCDC can take a year and a half.

But for this Covid-19 test kit, the time has been shortened to just 1 week.

Lee Dae-hoon, chief scientist who developed the test kit at Seegene, said he has devoted his life to studying diseases. However, Lee has never seen KCDC approve such a rapid test kit.

On February 12, Seegene submitted the application to KCDC to conduct the inspection process. Soon, the scientists knew with certainty that their test kit was effective. The Korean government assessed its accuracy based on its own patient samples.

Take the kit to the hospital

In mid-February, the number of Covid-19 infections in South Korea soared. On February 23, President Moon Jae-in had to raise the highest level of crisis alerts.

" Now we are at a turning point with the new corona virus. The next few days will be very complicated, " he said in a televised speech. " We need to identify people who are infected as soon as possible, and prevent the virus from spreading further . "

In response to this call, Chun made a quick decision. He ordered his 395 employees to quit all their regular jobs, focusing solely on the production of Covid-19 test kits. At least 50 other products of the company have been postponed production for 2 weeks.

" Emergency operations mean that all departments must be involved, you have to change your job ," he said. *"All our teams are focusing solely on product development for corona virus."*

That means even Ph.D. micro molecular micro PhDs have to put aside their research to sit on the production line.

Noh Si-won, the company's strategic director, said: *"Sometimes (senior scientists have to) do product packaging. It doesn't matter where they graduate from, everything is. It matters because we're all crazy here. "*

Seegene is currently one of the four companies providing corona virus test kit in Korea. However, they are reaching global markets, with demand from around 30 other countries also needing Covid-19 test kits, including Italy and Germany, countries that are using Seegene products.

At first, the company had difficulty meeting, but now they have tried to do. Seegene is producing about 10,000 test kits each week and each can test 100 patients.

That means they are producing enough kits for 1 million screenings a week, with the cost of each test being just under \$ 20. Noh Si-won said it was the first time he saw his company increase productivity up to this scale.



A worker at Seegene oversees a labeling line for the test kit vial.

Seegene currently has 3 months of inventory left for other test kits, so the company can meet the demand for orders in the next month or two. But Chun said it is important now that they continue to maintain the yield traits for the Covid-19 test kits. Their need now is not just financial gain.

"One way or another, we have to find a solution as soon as possible. That's why (we look to the market) worldwide ," he said.

In other countries

In many countries, their governments are struggling with the lack of Covid-19 testing. Chun explained that it could be because they still use manual testing instead of automated.

All tests that began then required a nurse to take a throat swab from the patient. When this sample is manually tested, a scientist will have to directly pipette the test chemicals onto the sample.

But in some countries where disease outbreaks are becoming more stressful, like in Korea, scientists are using automated testing machines. People will not need to mix chemical solutions anymore, the patient samples have been put directly into the machine for diagnosis.

Inside that machine, a robotic arm will grab the pipette to suck the solution and mix them to do multiple tests at the same time. According to Chun, this method takes only 4 hours to test for 94 patients - 4 times faster than manual methods before.

The involvement of robots also contributes to reducing the risk of human error or hospital techniques contaminating patient samples.



Another thing that may also be slowing testing efforts to control disease in some countries is the type of testing device they are using.

Chun said there are currently three genes that can be checked to confirm the corona virus's presence - and Seegene's kit can check all three genes at once. But this advantage is something that not all Covid-19 test kits do.

In the United States, test scarcity is still occurring. They don't even have an FDA-approved test kit. And that is why Chun wants to help. If the United States can use Seegene's testing system, it can test 1 million patients a week, he said.

" Their current problem is that there's no way to test their people. Without proper testing and diagnosis, no one will know what's going on."

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