Debate over speed vs. deliberation in developing vaccines heats up

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One week into the race to catch up with the swine flu virus, here's the score: Virus, hundreds. Vaccine, zero. While the virus has moved with lightning speed to four continents, U.S. authorities are debating whether to make a protective vaccine. Will it be too late?

Grown the tried-and-true way, a vaccine could need six months before it is ready to distribute.

But a new generation of scientists, frustrated by a technology that hasn't changed in decades, is seizing the chance to test faster ways to battle the bug. They hope their new tools can design a vaccine in time to combat the current outbreak; if not, they want to be ready when it returns -- or if there's an outbreak of a far worse pathogen.

With so much at stake, the debate over speed vs. deliberation is heating up.

"It's game time. We're ready to move," said a weary but exhilarated Mark Backer, CEO of the fledgling San Francisco biotech company Vaxart. "This is why we got into this business."

Early this week, a FedEx truck will arrive at Vaxart's lab, built in a South of Market warehouse. It will drop off a small parcel that contains an ice-cooled vial filled with a floating -- yet harmless -- gene of synthetic swine flu virus.

Backer's team will quickly insert the gene into a cell, and let nature take over. Like a biological factory, cells will multiply, reproducing thousands of progeny that each carry the flu gene. The result will end up in a capsule -- not a shot -- that they hope triggers an immunity against the H1N1 virus.

The approach -- as well as other innovative strategies by competing biotech companies -- could shave months from the time it takes to build a traditional vaccine. Vaxart, which also is testing an avian flu vaccine, aims to have a swine flu agent ready for animal testing by June.

High-tech vaccines are already combating other infectious diseases and have become one of the fastest growing segments of the pharmaceutical industry, generating over $1 billion in sales last year. But approaches to flu have not changed.

Authorities have good reason to be cautious, remembering the swine flu fiasco of 1976. When a small outbreak of flu sickened soldiers, authorities brushed aside all qualms and pushed through a presidential decision to vaccinate every man, woman and child in the country. But the vaccine didn't work well -- and far worse, triggered a rare paralytic disease. The virus never spread, and 32 people were killed by the vaccine.

This time, said the CDC's Dr. Anne Schuchat, the vaccine decision "needs to be made in a deliberate, thoughtful, careful way."

"We're trying to have interventions that won't be more harmful than the virus itself," she said.

At first glance, the traditional approach resembles breakfast at a corner cafeteria, employing old-fashioned racks filled with eggs. The only government-approved technique to make flu vaccine, it has been used

successfully for years by Novartis and GlaxoSmithKline.

Last week, CDC researchers isolated a strain of the H1N1 virus that grows quickly. In a high-security room, they are stripping off a critical gene and inserting it into an egg-loving and harmless virus to grow sufficient quantities. Although scientists are working around-the-clock, it takes time.

By early May, they hope to have enough of the virus to deliver to vaccine manufacturers, who will inject it into millions of eggs. Then there will be another wait while the virus incubates and finally is blended into a vaccine.

Because it won't be ready in time to be added to next season's conventional flu vaccine, authorities say the swine flu vaccine would likely be given as a second and separate shot -- sometime next fall, at the earliest.

"We've known for awhile that we are not particularly efficient about producing vaccines," said Margaret McLean, director of bioethics at Santa Clara University's Markkula Center for Applied Ethics.

"This epidemic woke us up to the fact that the production process we use now is archaic and also fraught with things that can go wrong," she said.

Biotech companies like Vaxart say their approach is fast because they don't need the real virus _ all they need is the genetic sequence of the critical virus gene, sent by computer. Then they build a synthetic gene. And they don't use chicken eggs, but cell cultures. Their manufacturing approach could produce larger volumes of vaccine, much more quickly, they say.

Backer recalls a sense of foreboding on the morning he read the first

news report of Mexican flu deaths.

"My first thought was: This is an unusual extension to the normal flu season. We should keep an eye on it," he said.

The announcement that it was a novel virus sent Backer and company founder Sean Tucker rushing to their laptops last Saturday morning. Tucker knew top CDC swine flu chief Ruben Donis -- and asked him to help.

They didn't need the gene code for the entire virus. Rather, they sought specific information about a bristle-shaped protein that sits on the surface of the virus, giving it a dandelion-like appearance. This protein, called hemagglutinin (HA), is the molecular key that flu uses to unlock and enter host cells.

That night, an e-mail arrived from the CDC -- spelling out the 1,800-letter-long genetic code for the critical HA gene.

By Wednesday, they had a promise from the Seattle-based gene assembly company Blue Heron Biotechnology to build the gene. Much like a printing press, Blue Heron's biologists pull the letters, called nucleotides, from bottles and arrange them into sequence that spells the HA gene.

The gene-assembly machines are running 24 hours a day to accelerate construction of the custom-built flu gene for Vaxart and several competitors. Vaxart's version should arrive in San Francisco early next week.

"It's a rush delivery," said Blue Heron founder John Mulligan. "These companies are in a hurry. There is a critical national need for new approaches for the rapid development of a new vaccine."

If their vaccine is proven safe, Vaxart hopes that regulators will let them move the vaccine quickly into humans for clinical trials. Because it is a capsule and does not need refrigeration, in an emergency it could be delivered to homes by U.S. Mail.

Stanford University vaccine expert Cornelia Dekker cautions that the conventional approach is far safer, because scientists can use facilities that are already government-inspected and licensed to make vaccines.

"The current vaccine manufacturers can just slip a new strain into their facilities. It's a safer bet than using someone who has never done it and never been licensed. It's an easier road," she said.

"It is always a little scary to do new things with a new virus that has literally just been discovered. There's not much time to test drive a new vaccine," she said. "The whole time frame is compressed."

But a crisis can be used to spur innovation that could save lives, said Backer and others.

"The alarm has gone off," he said. "It's shown us that we don't have the capacity to protect our population in a time frame that matters."

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