A rough roadmap to a COVID-19 vaccine

Nine months into 2020, there's one question on a lot of people's minds: "Are we there yet?"

We want to get back to watching weird movies in theaters, eating inside restaurants instead of on the sidewalks, and hanging out with our friends, without that pandemic dread setting in.

Bad news. We are not there yet. But even in the United States, which still has the highest death toll and case count in the world, there are some signs of progress.

In the US, which has relegated contact tracing efforts to the sidelines, and whose testing program is a muddled mess, most of the focus is on finding a vaccine. It's where a lot of people have pinned their "are we there yet" hopes. "When we have a vaccine" is also when people hope they can put down their masks and their worries, and live like it's 2019 again.

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Even if we don't have a definitive ETA, we do have a rough roadmap. This is what it's going to take for us to install a vaccine-based antivirus program:

A Brazilian doctor, Monica Levi, who volunteered to test the University of Oxford / AstraZeneca vaccine.
Photo by Nelson Almeida / AFP via Getty Images

Development — This is straightforward. We have to make and test the vaccine before we give it out. A few vaccines are already being tested on tens of thousands of volunteers. If these massive studies can show that the vaccines are both safe and effective, then that's going to be the first major hurdle

to people getting a vaccine.

Approval — Once a company has a vaccine with lots of data showing that it works, the next step (at least in the US) is for the Food and Drug Administration to approve it. Because of the urgency of the pandemic, it's possible that the FDA might decide to issue an Emergency Use Authorization, or EUA, to get the vaccine out faster.

Dr. Anthony Fauci, director of the National Institute for Allergy and Infectious Diseases, testifies before a House Subcommittee on the Coronavirus Crisis on July 31st.
Photo by Kevin Dietsch-Pool / Getty Images

Trust — In order for a vaccine to work, people have to take it. That means they have to trust the data from the company, and they have to trust the people approving it. If the FDA goes with emergency approval, they're also likely to face a skeptical public, who may worry that safety has been sacrificed at the altar of speed or political gain.

This part of the road is going to be especially bumpy, as we saw this week with the release of several documents from the CDC asking governments to start getting ready to distribute vaccines that might be available in small quantities as early as late October — right before the presidential election.

"This timeline of the initial deployment at the end of October is deeply worrisome for the politicization of public health and the potential safety ramifications," Saskia Popescu, an infection prevention epidemiologist, told *The New York Times*. "It's hard not to see this as a push for a pre-election vaccine."

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If a vaccine does come out then — something that experts have

said is unlikely — officials will have to strongly demonstrate that the vaccine is not a political ploy designed to garner votes.

"I would immediately resign if there is undue interference in this process," said Moncef Slaoui, the scientific lead of the US's vaccine development program, in a candid interview with *Science* this week. A former executive with GlaxoSmithKline, he also said, "The science is what is going to guide us." Whether that will be enough to convince the public is still up in the air.

Logistics — One of the reasons that the CDC sent local and state governments those documents is that a few of the top vaccine candidates are really finicky. We're facing a wildly complex distribution process that could involve multiple doses per person and super-chilled storage temperatures to keep the vaccine ready-to-use. Distributing the shot(s) will require needles, sure, but will also probably need freezers, refrigerated trucks, dry ice, and a whole lot of training.

There's also the question of who will get the vaccine first. Once a vaccine has data, approval, and a willing population, it still has to be produced, and that's going to take time. By most estimates, including the CDC's early guidance, there won't be enough vaccines for everyone until sometime next year. The National Institutes of Health are already working on a plan for who will get the vaccine first, with health care workers and high-risk populations at the top of the list.

Are we there yet? No. But we're getting closer.

Now, to switch gears — thanks for reading! This is the first time that Antivirus is getting sent to the inboxes of readers like you, and I really appreciate you taking the time to join us.

For folks who are new to this column-turned-newsletter, here's what to expect: There are plenty of places that are already brilliantly covering the effects of the pandemic – the political standoffs, the economic collapse, how we're coping. But underlying all of that chaos is still this tiny virus that's taken over the world. All the decisions, the deaths, the long-term effects end up coming back to the science of this virus: what does it do, and how can we stop it?

That's where this newsletter is focused.

Once a week, we'll give you a snapshot of what's going on in the world of COVID-19 research. Like I said in the first instance of the column, back in July, we'll be looking at stories that explore the **research** into the virus, **development** of treatments and vaccines, and works that give a human **perspective** to the pandemic.

Here's what else is going on this week:

Research

What we're learning about the virus itself: how it spreads and what it does in the human body.

COVID-19 Can Wreck Your Heart, Even if You Haven't Had Any Symptoms
For the past several months, health care workers have noticed that some COVID-19 patients develop a worrying symptom – inflammation of the heart muscle, or myocarditis. Emergency room physician Carolyn Barber pulled together a lot of the recent research in a writeup for *Scientific American.* We still don't know how common myocarditis is in COVID-19 patients or how long this particular condition lasts for people who do get it, but the data and cases that doctors are seeing is cause for concern.
(Carolyn Barber / *Scientific American*)

Why Does the Coronavirus Hit Men Harder? A New Clue
A study in *Nature* published last week found that women produce a stronger immune response to the virus than men. It was a small study, and it didn't tell researchers why the differences exist. But it could be important information as researchers continue to look at how potential vaccines could affect different people.
(Apoorva Mandavilli */ The New York Times)*

Flu Season and Covid-19 Are About to Collide. Now What?
This story is more about preparation than research, but flu season is coming and bringing a lot of complications along with it. Maryn McKenna has a good look here at what might happen when the pandemic collides with seasonal flu.
(Maryn McKenna */ Wired*)

Development

Notable news from the vaccine and treatment fronts: we won't link to every paper, but we'll keep track of general progress and major milestones when they come up.

Inexpensive steroids reduce deaths of hospitalized Covid-19 patients, WHO analysis confirms
We've seen evidence since June that a cheap steroid can help improve survival in severe cases of COVID-19. Now, there's even more evidence that this works, thanks to a new analysis from the World Health Organization.
(Adam Feuerstein */ STAT*)

Human trials of Oxford coronavirus vaccine have begun in the US
The Oxford vaccine, made in partnership with AstraZeneca, just started its testing efforts in the US after already starting tests in Brazil and the UK. The first US participant in the trial was a man who lost seven relatives to the disease.
(Michael Le Page */ New Scientist*)

Perspectives

This is a disease that has profoundly shaken, wrecked, and ended lives. At a distance, we can sometimes forget that each case and death was a human being. These stories remind us that there are people behind each tick on the case counter or jump in the death toll.

ICU doctor says the challenges of treating COVID-19 patients have changed dramatically since March
John Evankovich is an ICU doctor. He's been treating COVID-19 patients for months. In this interview, he talks about his experiences with treating patients and with convincing people to take this disease seriously.

> *I think you can break through some of that confusion and some of the 'That can't happen to me' attitude if you see a personal story with someone you have a connection with, someone who lives close to you, who goes to the same church or school district. Those are more powerful than directives from above.*

(Oliver Morrison */ Public Source*)

'A real kick in the gut': Dwayne 'The Rock' Johnson urges fans to wear masks after he and his family get covid-19 (Tim Elfrink */ The Washington Post)*

Sent Home to Die
Not everyone has Dwayne Johnson's good fortune. In New Orleans, some COVID-19 patients were sent home or to hospice to die, against their families' wishes. This is a heartbreaking and important investigation that shines a light on how the health care system can fail some of the most vulnerable patients.
(Annie Waldman and Joshua Kaplan */ Propublica*)

More Than Numbers

A weekly reminder of the scale of this pandemic.

To the more than 26,655,849 people worldwide who have tested positive, may your road to recovery be smooth.

To the families and friends of the 875,510 people who have died worldwide — 187,777 of those in the US — your loved ones are not forgotten.

Thanks for joining us this week, and stay safe, everyone.

https://www.theverge.com/2020/9/5/21422361/covid-19-vaccine-roadmap-pandemic-antivirus-newsletter