Peter Hotez, MD, PhD, on his 10 years of work on coronavirus

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Featured topic and speakers

In today’s COVID-19 Update, Peter Hotez, MD, PhD, dean of the National School of Tropical Medicine at Baylor College of Medicine and co-director of the Texas Children’s Hospital Center for Vaccine Development in Houston, Texas, talks about the 10 years of research into spike proteins and the coronavius that was already in place when Operation Warp Speed was set in motion.

He also details his work to provide enough COVID-19 vaccines for Africa, Latin America and other poor countries across the globe.

Learn more at the AMA COVID-19 resource center.

Speakers

- Peter Hotez, MD, PhD, dean of the National School of Tropical Medicine, Baylor College of Medicine

Transcript

Unger: Hello, this is the American Medical Association's COVID-19 Update. Today, we're talking with Dr. Peter Hotez, dean of the National School of Tropical Medicine at Baylor College of Medicine, and co-director of the Texas Children's Hospital Center for Vaccine Development in Houston, Texas, about his work with vaccines and how we need to approach the next few months. I'm Todd Unger, AMA's

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chief experience officer in Chicago. Dr. Hotez, this is I think your third time on the COVID-19 update, that officially makes you a friend of the show, as Stephen Colbert would say, and we're excited to have you back.

Since we talked the last time, we spent a lot of time talking about misinformation in the past, and today we want to focus on something different, which is your work in vaccine development. Can you talk a little bit about your journey and what it's been like doing that?

Dr. Hotez: Oh, thanks Todd. I'm honored to be the third time with the American Medical Association. Thanks so much. Yeah, so I'm an MD, PhD vaccine scientist. I did the MD, PhD program at Rockefeller University and Cornell back in the 1980s and knew I wanted to do vaccine development then. Because probably pediatrics is the specialty most closely related to vaccines, I did some pediatric training as well, and I was an attending physician in pediatric infectious diseases at Yale for many years. Now I'm mostly focused in the lab and developing vaccines.

We created a center here in Texas to develop vaccines that the big pharma companies are not in a position to make because there's not a financial model for the shareholders. We've developed vaccines for schistosomiasis and Chagas disease, and hookworm infection. These are all in clinical development. This is a center co-headed with myself and Dr. Maria Elena Bottazzi, my science partner for the last 20 years. Now, about 10 years ago, we got approached by a group at the New York Blood Center led by Shibo Jiang and Lanying Du that had a pretty good idea for coronavirus vaccines.

At the time, nobody cared about coronavirus vaccines. They were sort of orphaned. So, we adopted it just like we adopted Chagas disease vaccines and leishmaniasis vaccines. We did it because it was a little bit of a different dynamic there with Chagas and leishmaniasis. These are some of the most common infections of the world's poor. With coronaviruses, these are pandemic threats, so they kind of seem to arise out of nowhere and cause explosive epidemics and pandemics. So, we saw this happening with SARS in 2002, the Severe Acute Respiratory Syndrome rose out of Southern China, then it affected Toronto, Ontario, and shut down Toronto.

Then there was Middle Eastern Respiratory Syndrome in 2012 that did a lot of damage on the Arabian peninsula and in South Korea, so we said, you know what? There's something going on here with coronavirus infection, so we adopted this coronavirus vaccine program, and we've learned a lot over the last decade. We learned that the spike protein is the soft underbelly of the virus and we showed that if you deliver the spike protein as a vaccine, it's highly effective, induces what are called virus neutralizing antibodies.

All that work we did over the last decade has laid the groundwork for our current generation of COVID-19 vaccines. Now we also use the same approach that we used for SARS and MERS to develop our own COVID-19 vaccine that's now being scaled up for production in India, over a billion doses now are being made and it's being tested across India. So, we think this is going to be really important as a low

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cost COVID-19 vaccine for global health and fill an enormous hole right now, because where I'm really worried and my colleagues are really worried, we won't have vaccine for COVID-19 for Africa, Latin America, and the poorer countries in Asia, because the mRNA vaccines are not going to filter there. It's a lot of pressure, but it's also an incredible opportunity as well.

Unger: Well, I have a couple of follow-up questions then. For one, I think people think about Operation Warp Speed, that all of this happened in the past year. But really what you're telling me is there's been a foundation of work to really understand the coronavirus itself and the family of potential issues that could come out of that, that formed the basis for that work. Am I understanding that right?

Dr. Hotez: Yeah, that's absolutely right. Especially with the anti-vaccine lobby that we've talked about in the past, they say these COVID-19 vaccines can't be for real, they sprang out of nowhere. How can you make a vaccine in a few weeks? Well, the answer is they didn't. All of the vaccines for Operation Warp Speed build on our research, and my colleagues' research over the last decade showing how we can deliver the spike protein. It's a 10 year R&D program just like any other vaccine. When people hear that, that's actually builds confidence.

People feel more comfortable taking it. But one of the problems is, Operation Warp Speed has not really had a communications program. It was left to the pharma CEOs, and you know how that works. The pharma CEOs, when they're writing their press releases, they're not writing them for you or for me. They're writing for their shareholders and they tend to spectacularize what their companies have done for obvious reasons, but in the process of that, they leave out the inconvenient truths that it builds on a ten-year R&D program.

That's unfortunate, because I think more people knew that, then more people would be accepting of COVID-19 vaccines.

Unger: Very interesting. Now, you mentioned that you're working on something that would be deployed across India. One thing I've heard from different guests on the Update is, it's so important to reach all countries with the vaccine. Can you talk about why that's the case?

Dr. Hotez: Well, remember, if all we do is vaccinate the American people and don't do anything about the world's low- and middle-income countries, that just creates a huge virus incubator for new variants to emerge, and that makes our nation susceptible as well. So, there's no real option here. We have to figure out a way to vaccinate both the United States and the rest of the world, otherwise, it's going to be self-defeating.

Unger: Exactly. Let's talk a little bit more about the variant situation. I mean, I think, literally, there are thousands, and I guess you're on the lookout for the ones that could rise to the top in terms of being really problematic. Can you talk about ... It's expected obviously for this kind of mutation to occur, but are we seeing more with this virus than we expected? And if we are, why?

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Dr. Hotez: Well, there are certain things I expected and there've been certain surprises, unpleasant surprises. So, we know all RNA viruses mutate, and we knew that the COVID-19 viruses, SARS coronavirus type two would undergo mutations. That's how we trace lineages. That's how we know, for instance, that the virus that affected New York City came in from southern Europe. Because we can use the mutations, the natural mutation cycle of these viruses in order to detect subtle differences.

I think the surprise was finding these variants that had more than a dozen mutations in them at once, and including multiple in the spike proteins that are changing their behavior to become more transmissible. We weren't quite expecting that, and there's two or three that have risen now to the top in terms of transmissibility and concern. This includes the U.K. variant that came out of southern England, the South African variant and the Brazil variant, and there's going to be others that will follow.

But the U.K. variant was very interesting. It first popped up in southeastern England, in Kent, England, outside of London back in September. Then by November, it was the dominant variant in southeastern England. We were like, oh my God, what's going on here? It clearly, it was more transmissible, was out competing the other virus lineages, and so we knew this was going to be a problem. Journalists were asking, "Do you think this virus could get here?" I'm saying, "Hey, I got news for you. We have not been looking. I could promise you it's already here."

Because we have underachieved in terms of doing virus genomic sequencing, which has been one of the problems of our COVID-19 national response last year. Now it seems to be accelerating quickly, so I'm extremely worried about the U.K. variant. Now, the numbers are going down in the US. We peaked at around 250,000 new cases, confirmed cases a day. We're getting below 100,000, and everyone's kind of high-fiving each other, but I'm looking at this and saying, uh-oh, this is not good. Because I think the numbers are going to quickly start to accelerate again, and we're going to see a big uptick in transmission.

The other initial observation the Brits made was that the mortality was higher, mortality rate and severity was higher. I looked at that initially, and I was a little skeptical because, if you looked at the pictures of what was going on in the U.K., So a lot of patients on gurneys in the hallways, and they said, I don't know, that's really more greater severity. How do you know that it's not the hospital getting overwhelmed with the number of cases? But it seems to be for real, that the severity is worse as well.

I'm really holding my breath as we get into March and April, and I think I said on one of my interviews on one of the cable news networks, I said, beware of the ides of March. I have to get back to Shakespeare. This is going to be a really serious threat. I do think we are going to be in a much better place over the summer because the President Biden has said, look, we've got a hundred million doses of the J&J vaccine coming, 100 million doses of Novavax, we'll have a couple of hundred million of the two mRNA vaccines from Moderna, Pfizer, will be able to vaccinate fully the American people.

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I get that, and I agree, and I think we're going to be in a great position moving into July and August. The issue though now is we've got these variants coming in March and April and May, and how do we buy time to both get people vaccinated, enforce all those variants. That's, I think, the biggest crisis facing us right now in our COVID-19 epidemic. In the meantime, in Africa, the South African variant seems to be taking off, and I'm really worried for Sub-Saharan Africa, because until now, they've done pretty well with this, but I'm worried that time's coming to a close and they could experience a pretty terrible epidemic.

As bad as 2020 was, now we're looking at version 2.0 of this pandemic from the variants. I'm almost thinking about it like a different virus, even though we know a lot about how it behaves, in terms of how we manage, it's going to be, a whole new set of factors to consider.

Unger: Just taking a step back and kind of the lay person's terms, you pointed out that we are at this place where we see the numbers. They're still high, but they have been coming down. What's the dynamic that occurs when one variant kind of takes over, so to speak, how does that play out?

Dr. Hotez: Well, I think the way it plays out is, as this virus is being transmitted, this U.K. variant is out competing the others, so it becomes the dominant one that's being transmitted in a community setting. So, you'll start seeing more and more people shedding that virus even asymptomatically, and so that one, we'll see ...as we start collecting virus isolates now, more and more, we'll see the U.K. one become the predominant one.

Unger: What happens to the other strain?

Dr. Hotez: The U.K. variant, now, that virus, those virus particles are in the mouth and nose and throat of everybody, and so that doesn't give the chance for the other variant to come in breachable levels.

Unger: You mentioned the threat of these variants has made the race to get a large portion of the population vaccinated, even getting vaccinated quickly more important, and you need to get everyone vaccinated by kind of late spring, early summer. Is this achievable? How do we get there?

Dr. Hotez: I don't know. What I don't have any insight from the administration is, what's in the freezer? What do we have stockpiled? I don't really have a good sense of that. Do we even have the supply to do that? I think that's one question. If that's the case, what are options? In order to maximize vaccination now. My colleague, Mike Osterholm and Eric Topol, and I respect a lot, we talk every week, their view seems to be focusing on going with a single dose of the two mRNA vaccines and getting more people immunized. I'm not as enthusiastic about that because I don't think one, we have enough of the doses to make a difference.

Again, we don't really know. Also, I'm worried about the incomplete protection, especially to the variant. I don't know if we'll see any protection to the new variant from that one. So, that's issue

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number one. I think the alternative is ... I'm not saying we shouldn't do it. I'm just not as out there beating on that drum as Mike and Eric, are two individuals I think who are incredibly brilliant and have a lot of good ideas. I've proposed a different approach based on what I've heard, that we may have tens of millions of doses of the AstraZeneca vaccine stockpiled already.

That one we know works really well against the U.K. variant. The one that we're worried about, and if it's true that we really have tens of millions of doses stockpiled, let's release it now, because the European Medicine Agency's, the European regulatory body equivalent to the FDA, has already given the green light to distribute across Europe. Let's do the same. Let's not wait what the FDA ... my understanding is our FDA's waiting for the results of our own phase three trial in the U.S. I'm saying, given the dire emergency, maybe we should just release it now.

Instead of trying to finagle with the two mRNA vaccines in a single dose, keep that as is, because we know it works, and let's then explore an alternative option of rolling out the AstraZeneca vaccine.

Unger: Well, speaking of additional vaccines, assuming that Johnson & Johnson vaccine gets authorized and maybe obviously a few others, is there a certain strategy in place for who gets which vaccine?

Dr. Hotez: I don't know. I think, no, not really. The only difference would be we're hearing the AstraZeneca vaccine may or may not work as well in older individuals, and that's very controversial. I think some people believe it will, others, not so much. In which case, maybe you'd hold off the AstraZeneca vaccine for younger populations. That's a possibility. The J&J vaccine I think works well in all groups. I also don't know if the plan is for a single dose vaccine or a two dose vaccine, because in the two dose vaccine, the phase one trials look really good. We're waiting for the phase three results of that one as well.

There's still some more information. My understanding is that the AstraZeneca vaccine will have 30 million doses by April, and then we'll get to the 100 million by June, but this is all fluid. There's changes in manufacturing. We'll learn more in time.

Unger: Well, there's—

Dr. Hotez: Again, the good news is that I think we're going to be in a very good position in July and August in getting the U.S. population fully vaccinated, and that's going to be the best hope for getting back to a level of normalcy. People can feel comfortable with air travel and visiting friends and family, and no question, quality of life. I think also, it's likely that it may interrupt asymptomatic transmission as well. We haven't proven that yet, but once we show that, then the masks come off, and so life will look much better. A lot to look forward to. The key is the uncertainty of what happens in March, April and May. That's the big question right now.

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Unger: Well, there's been a lot of talk about vaccine hesitancy, and it's being fueled in part by something you're familiar with, continuing campaigns of misinformation, especially from the anti-vaccine groups. What are you seeing and what can physicians do to counteract this so that people do get vaccinated when it's their turn?

Dr. Hotez: Yeah, we just published an interesting paper. It was not led by me, but I was a co-author. It was led by Tim Callaghan's group at Texas A&M, they're a social science group, and they did a survey. What was interesting about it is it came up pretty identical to what the Kaiser Family Foundation found. The two most hesitant groups are somewhat diametrically opposed in many ways. One were conservative groups, Trump voters, Republicans. That's what we found, what Kaiser found and also the African American community.

Talk about two very different sides of the political spectrum. Now I'm doing something very interesting. I'm going on African American talk radio shows, some of the black radio shows, including Chicago, and that's been ... I did Chicago African American program radio program yesterday. I say that because I know the AMA is based in Chicago. Then I'm also going on conservative talk radio shows and TV stations. I've done Newsmax, and back on Fox News and The Daily Caller. It's great. I really enjoy being able to talk to different groups of people, and really understand what the basis of their hesitancy is.

With the conservative groups, twice now, they've really probed me hard about this concept of mandates. They've sort of created the straw man, saying that they're really worried the government's going to force COVID-19 vaccines on us. What I point out is, look, it's not going to happen. The vaccines just aren't there, right? We don't have vaccines to make that happen. The one thing I say with regards to mandates, the one situation where I could see a mandate happening is on university campuses, where you're in a dormitory settings, because right now, we require a meningococcal vaccinations, and for obvious reasons.

Maybe that would be a reasonable requirement for university students to get COVID-19 vaccinated, if we have the vaccines, say by the fall, but otherwise, I don't see mandates as an issue. Then with the African American community, a lot of it is based on historic distrust of government and a horrible legacy of Tuskegee experimentation. But the other thing I point out that many are not aware of was how anti-vaccine groups deliberately targeted the African American community in 2019.

They staged these Harlem vaccine forums, lots of misinformation, and I think that did a lot of damage. It's a story not widely reported. The other thing, when I talked to African American groups, I say, look, you have to look at who's dying from COVID-19. In addition to higher rates of death and hospitalization, there are some qualitative differences as well. The Centers for Disease Control last year reported that, whereas in non-Hispanic white communities, most of the deaths were over 65, only 13% were under the age of 65. In the African American/Hispanic communities, more than a third of the deaths were under the age of 65.

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Unger: Wow.

Dr. Hotez: It's moms and dads in their late 40s, 50s, early 60s. Those are the ones dying of COVID-19. Again, that's a story that's not really getting out in black and brown communities and so that's an important message.

Unger: Why do you think that's the case, that, that story isn't getting out?

Dr. Hotez: I don't know. One of the things that I do is when I go on a talk radio shows that are focused on specific groups, I sort of have a Rolodex in my head of different messages that I think are important, that I try to see what sort of resonates. You can see the body language and, especially if there's call-ins, and you'll see the light bulb go on. When I talk about that, that high rate of deaths in 40 and 50 year old mom's dead. Yeah, I mean, who doesn't get that? That really resonates.

I feel like I'm making a contribution that way by taking that approach, by talking to different groups, going through my Rolodex of things that I think are important and seeing what pings back and what seems to be resonating with those groups.

Unger: Well, last question. We've heard a lot about the growth of vaccines scams that target people who desperately want a vaccine. Are you hearing this, and what should physicians be telling their patients to watch out for?

Dr. Hotez: Actually, I haven't heard that. It's horrifying, right? So, counterfeit vaccines basically.

Unger: Or getting out of money, whatever it is.

Dr. Hotez: Or saying, if you pay a fee, sign up on this website here, and it's all a scam. That's just terrible. I mean, some people just have no moral compass. That's just terrible. But the one thing I did want to talk about is, I'm a little worried now we're hearing these stories in the press about unused vaccine, and being so focused on the one A, one B, one C guidelines, that rather than violate those guidelines, they're throwing vaccine away. To me, that's unconscionable.

Equally unconscionable, is district attorneys and others are prosecuting people by vaccinating for, in some cases, even physicians for vaccinating outside the guidelines. There was a celebrated case here in Houston, and I don't know all the details, but my point is, let's remember something, the guidelines are guidelines. Never ever, ever throw vaccine away if there's vaccine left and you have the ability to immunize anybody, it's better than throwing it away, because eventually, we have to vaccinate the whole American population in order interrupt transmission.

It's only doing good by getting people vaccinated. I don't know how that happened. I actually am of the opinion that the ACIP CDC guidelines, Advisory Committee on Immunization Practices, are well-

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intentioned and carefully thought out. But I think there was an absence of realization how fragile our health care system is and can't really handle a lot of complexity, that we just don't have a good system in place for immunizing adults. As a result of that, we're relying heavily on the pharmacy chains and the hospital systems. By the way, I think the pharmacy chains are doing a great job as are the hospital systems, but they have limited bandwidth. We're going to need other options for vaccinating the American people.

Unger: Well, Dr. Hotez, I know you're very, very busy, and we really appreciate you being on the update today and giving us your important perspective. We'll be back with another COVID-19 update tomorrow. In the meantime, for resources on COVID-19, visit ama-assn.org/covid-19. Thanks for joining us today, and please take care.

Disclaimer: The viewpoints expressed in this video are those of the participants and/or do not necessarily reflect the views and policies of the AMA.

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